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Local and Global Coherence in Children's Narrative Processing

by

Katherine D. Tiede

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

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IN

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled Local and Global Coherence in Children's Narrative Processing submitted by Katherine D. Tiede in partial fulfilment of the requirements for the degree of Master of Science in Psycholinguistics.

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Supervisor

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Date. July 29, 1986

For my parents
Irmgard and Werner Tiede
for their constant loving support
throughout my many years in university.

Abstract

This study investigated the role of local and global coherence of story structure in sixth grade children's processing of narratives. In the literature on story comprehension, researchers have focused on the global aspects of story structure and have overlooked the fact that a disruption of the story's global structure (i.e., its superstructure) usually results in a concomitant disruption of the local coherence, cohesion, and macrostructure of the story. In an effort to investigate this oversight, three story organization conditions were created: canonical, marked movement, and unmarked movement. The first condition, canonical, adhered to the Stein and Glenn (1979) story grammar in terms of the organization of story information, and was both locally and globally coherent. Unmarked movement stories were created by moving the consequence category statements in the canonical two-episode stories without marking these movements linguistically. This condition lacked both local and global coherence. The third condition, marked movement, was identical to the second except that the movements of the statements were marked by connectives so that the local coherence between statements was preserved. Although this version lacked the coherence of the canonical superstructure, the macrostructure of the story was coherent because the connectives that linked the statements together created a coherent global meaning for the story.

Two tasks were used to assess the children's processing of the stories: a verbatim recall task and a comprehension question task. The subjects, 72 native English-speaking grade six children, were asked to listen to one of two stories under one of the story conditions. After a short interruption task they were asked to recall the story exactly as they heard it. Then they were asked the comprehension questions.

The results of the recall task revealed that local coherence of story structure is an important factor in the children's processing of stories. In terms of the quantity and quality of recall, the sixth graders recalled the marked movement versions better than the unmarked movement versions, and most interestingly, as well as the canonical. Local coherence also played an important role in the children's ability to answer the comprehension questions, as evidenced by their significantly better performance in responding to questions on the marked movement than unmarked movement versions.

The sixth graders were able to recall and comprehend story information even when the superstructure was disrupted, so long as this disruption was marked by linguistic devices such as the connectives. These connectives provide the listener with essential information about the global structure of the story, and with this information the listener can create a coherent macrostructure for the story. Clearly, the presence of a

canonical story superstructure is not the only significant factor guiding story recall or comprehension: the processes involved draw on knowledge of both local global coherence of story structure.

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1. INTRODUCTION

1.1 Preliminaries

The basic units of linguistic analysis in psycholinguistic research have traditionally been at or below the sentence level. In the past decade, however, discourse (i.e., units of language greater than the sentence) has become an important topic of investigation in developmental and adult psycholinguistics. Investigators have studied the comprehension and production of various discourse types ranging from conversation to prose. One discourse unit that has had a long history of investigation in various disciplines is the narrative. The story, one type of narrative, is the focus of the present investigation.

Stories have been of interest to psychologists, anthropologists, folklorists, and linguists alike. Research in anthropology and linguistics has focused on the nature and structure of social and linguistic information in stories. Complex analyses of both story content and structure have been done (e.g., Barthes, 1966; Bremond, 1973; Greimas; 1971; Levi-Strauss, 1955; Prince, 1973; Propp, 1958). On the other hand, early psychological research centered on how the listener's prior knowledge of stories interacted with the cognitive processes and structures involved in story comprehension (Bartlett, 1932).

Aside from Bartlett's (1932) seminal work, however, very little research was conducted in this area until the 1970s. At that time, the study of story comprehension moved to the forefront of research in cognitive psychology and artificial intelligence. Investigators in these fields built on the work of Bartlett (1932) by further developing and testing theories about the nature of the individual's knowledge of story structure, and the role of this and other types of knowledge in story comprehension.

The proponents of story grammar theories have played a major role in this research on story comprehension (e.g., Mandler & Johnson, 1977; Rumelhart, 1975; Stein & Glenn, 1979; Thorndyke, 1977). Story grammars are defined by a set of rules describing the structure of information in stories, and are assumed to represent the individual's knowledge of story structure. Moreover, during comprehension, this knowledge is assumed to take the form of a cognitive schema that guides processing of the story. Whereas story grammarians have focused on the knowledge of story structure, others have investigated additional types of knowledge involved in the comprehension of stories as well as other forms of text. In artificial intelligence, the work of Shank and Abelson (1977) on "script-based" and "plan-based" knowledge has focused on more general human knowledge structures employed in the comprehension of text. Script-based knowledge relates to stereotypical action sequences which incorporate a set of ordered components

involved, for example, in going to a restaurant or a movie, while plan-based knowledge relates to mechanisms for problem solving. Some investigators have considered the use of knowledge about human social interaction in understanding the goals, plans, and actions of characters in different stories (Bisanz, 1982; Bisanz & Voss, 1981; Goldman, 1982; Omanson, Warren, & Trabasso, 1978).

One area that has been overlooked in this research on story comprehension is linguistic knowledge. As a part of their linguistic repertoire, children must acquire knowledge about the linguistic properties of discourse. Linguistic units larger than those at the sentence and word level have their own structured rules and guiding principles which must be learned. Knowledge about the manner in which linguistic devices tie sentences together to form larger cohesive units is an important aspect of the comprehension and production of discourse. Moreover, the types of strategies the listener applies in using this linguistic knowledge is also an important area of discourse comprehension, and more specifically, story comprehension research.

1.2 Aim of the Study

In order to investigate the linguistic knowledge relevant to story comprehension, it is necessary to develop an understanding of the linguistic aspects of discourse structure in general. One of the most fundamental properties of discourse is semantic coherence. The term

coherence denotes some form of relatedness or unity and it is what makes discourse more than a collection of unrelated sentences. Semantic coherence connotes semantic unity at both a local and global level in the discourse (van Dijk & Kintsch, 1983). Local coherence is defined in terms of the semantic relations that hold between clauses and sentences, whereas global coherence characterizes the meaning of the discourse as a whole.

Traditionally, linguists have investigated the nature of local coherence and the way in which the linguistic system expresses this coherence (e.g., van Dijk, 1972, 1977a; Halliday & Hasan, 1976; Winter, 1968 (cited in Hoey, 1983)). In contrast, researchers from various disciplines have investigated the global coherence of discourse. Van Dijk and Kintsch (1983) use the terms "macrostructure" and "superstructure" to define the two major forms of global coherence that have been studied. Macrostructure is an abstract semantic description of the global content of discourse (van Dijk, 1972, 1977b, 1980). The concept of macrostructure was proposed to account for the intuitive notion of the "gist" or "theme" of the discourse. Superstructures, on the other hand, are human knowledge structures or schemata about specific text forms, such as the story. The superstructure supplies the syntax or organization for the global meaning of the discourse (i.e., its macrostructure). This organization is defined in terms of story information categories and the rules that order the

categories. The concepts of story grammar and story schema are examples of superstructure.

For those discourse structures that have been characterized in terms of superstructure as well as local coherence and macrostructure, the relationship between these forms of coherence is complex. Stories are coherent not only because various cohesive devices link constituents together locally, and because some form of global organization in terms of macrostructure and superstructure is present, but also because local and global coherence are intricately related. Although linguistic cues work primarily at the local level, there is a cumulative influence of these devices at the global level. In this way, local coherence feeds into global coherence. By way of example, there are several linguistic devices that may signal important changes in either the macrostructure or superstructure (e.g., titles and headings, topic-comment assignment in sentences, topical expressions, frequency of mention, connectives) (van Dijk and Kintsch, 1983). If, for example, *Sue* is marked as the subject or topic of several sentences in a discourse, the listener may assume that *Sue* is the main character of the discourse as a whole. Moreover, these linguistic devices also signal connections (e.g., additive, temporal, causal, adversative) between events in the discourse, and thus assign an overall coherence to the macrostructure. Furthermore, topical expressions such as *once upon a time* or *suddenly* may signal

important changes in story superstructure. On the other hand, global coherence provides the overall theme of the discourse, so locally coherent relations are defined in relation to this unifying theme.

Clearly both local and global coherence are important components of discourse structure. In story comprehension, the listener must possess knowledge about the manner in which local and global coherence are established in stories. In turn, this knowledge serves as a foundation for some of the strategies the listener uses in comprehending stories. A major monitoring strategy involved in the comprehension of discourse is the assumption that sentences of a discourse are in fact coherent. This assumption, the so-called "normalcy" condition on semantic interpretation, is so strong that even in the face of discourses that may not be coherent, listeners try to establish meaningful interpretations (van Dijk, 1985).

Current research on how coherence of story structure is important in story comprehension has focused primarily on global coherence. In their work on superstructures, story grammarians have manipulated the syntax of global coherence in story structure without considering the effect of these manipulations on the local coherence and macrostructure of the story. Therefore, the effect of reducing coherence in the superstructure has been confounded by the fact that local coherence, and in turn, the coherence of the macrostructure have also been reduced. Further research on

the effect of disrupting the local and global coherence of stories on comprehension is necessary in order to evaluate the listener's knowledge of local and global coherence, and the strategies listeners adopt in order to comprehend coherent and incoherent stories. The present study was designed to investigate the effects of systematically varying the local and global coherence in story structure on children's recall and comprehension of stories.

1.3 Overview

Chapter Two consists of a review of studies on the nature of local and global coherence in story structure, and the role of these forms of coherence in adults' and children's story comprehension. The experimental method is described in Chapter Three. In Chapter Four the results of the experiment are presented and discussed. Chapter Five is a summary of the main findings of the experiment and includes some implications for future research in light of the results of this study.

2. LITERATURE REVIEW

2.1 Introduction

This chapter is devoted to a review of studies on the nature of local and global coherence in story structure, and the role of these two forms of coherence in adults' and children's story comprehension. To date, the bulk of research on global coherence in story structure has been on superstructures, that is, story grammars and story schemas. Numerous claims about the importance of story schemas in story comprehension have been made on the basis of research in which the structure of story information is manipulated; however, the effects of such manipulations on local coherence and macrostructure are generally not discussed. In light of this, the review of studies on global coherence focuses on the work of story grammarians on story grammars and story schemas.

With regard to the research on local coherence, the primary focus has been on the nature of linguistic cohesion between clauses and sentences. In their classic book Cohesion in English, Halliday and Hasan (1976) describe how local coherence is characterized through the grammar and vocabulary of the English language. They use the term "cohesion" to refer to local coherence that is expressed through the linguistic system. An instance of cohesion, one pair of cohesively related items, is a tie. The concept of

a tie makes it possible to investigate the linguistic devices that mark these semantic relations between clauses and sentences. Within a narrative structure such as the story, temporal and causal relations are fundamental building blocks, and the cohesive tie that can mark these relations is conjunction. Conjunction differs from other relations (i.e., reference, substitution, ellipsis, and lexical cohesion) in that it is not simply an anaphoric or cataphoric relation. The conjunctive elements or connectives (i.e., subordinators and sentence conjuncts) are not cohesive themselves; rather, they express particular meanings that presuppose the presence of other elements in the discourse (Halliday & Hasan, 1976). Connectives specify what has gone before and what is to follow. In this way, connectives make local relations explicit, and also assign an overall coherence to the story. With this in mind, the review of studies on local coherence focuses on those studies that have investigated the function of connectives in establishing local coherence or have considered the role of connectives in adults' and children's story comprehension.

This chapter consists of seven sections. First, the manner in which story grammar theories characterize global coherence in story structure is described. Experimental studies on adults' and children's use of story grammar knowledge and story schemas in story comprehension are reviewed in the second and third sections respectively. The

fourth section focuses on the nature of local coherence, and the role of connectives in establishing cohesion across sentences. A review of experimental studies on the role of connectives in adults' and children's story comprehension follows in the fifth and sixth sections respectively. In the seventh section, the motivation and objectives of the present study are stated.

2.2 Global Coherence in Story Structure

2.2.1 Story Grammar Theories

Story grammar theories (e.g., Mandler & Johnson, 1977; Rumelhart, 1975; Stein & Glenn, 1979; Thorndyke, 1977) have had a significant impact on story comprehension research. In fact, these theories developed primarily out of Bartlett's (1932) initial work on story memory. Bartlett (1932) reported that adults rarely recalled stories exactly as they heard them. Rather, he noted that story information was often transformed, that is, either new information was added or some of the original was deleted. As a result, he concluded that story memory was not only a function of the organization of the incoming information, but was also dependent upon the listener's mental operations and the cognitive structures already acquired. Bartlett (1932) referred to these cognitive structures as "schemata." He defined a mental schema as "an active organization of past reactions and experiences which are always operating in any

well developed organism" (p. 201). In order to further investigate the nature of this cognitive schema for stories, story grammarians developed a structural description of the story known as the story grammar. They in turn proposed the story schema to account for the manner in which humans use this story grammar information to guide the encoding and retrieval of information in story comprehension.

Theories of story grammar share three basic assumptions about story structure: (a) stories have some form of internal structure, (b) stories can be described in terms of a hierarchical system of categories and logical relations that exist between these categories, and (c) stories have an ideal or canonical structure. Hence, a story grammar must contain rules that define the types of information categories in the ideal or canonical story, as well as the types of relations that exist within and between the categories.

There are several different formulations of story grammars in the literature (Mandler & Johnson, 1977; Rumelhart, 1975; Stein & Glenn, 1979; Thorndyke, 1977). For the most part they are very similar, differing primarily in the terms used to refer to different categories, and in their degree of elaboration. According to Stein and Glenn's (1979) story grammar, the initial division of a story is in two parts: a setting category plus an episode system. Table 1 contains a description of the categories contained in a single episode story, and an example of such a story divided

into story categories, based on the Stein and Glenn (1979) grammar. The setting category introduces the protagonist, and normally includes information about the social, physical, or temporal context of the story. This information is not part of the episode, but it may constrain the possible types of event sequences.

The episode system is the main higher order unit of the story, and the system may contain one or more episodes. An episode consists of a "behavioural sequence" (Stein & Glenn, 1979) which includes five information categories: (a) the initiating event (the internal and external events that affect the character), (b) the internal response (the character's internal response to these events), (c) the attempt (the character's external response to these events), (d) the consequence (consequences that result from the external responses), and (e) the reaction (the character's reaction to the consequences). Integral to the behavioural sequence is the notion that there is a causal chain of events that connects each of the categories in the episode.

Each information category contains specific types of information and serves a unique function in the grammar. The initial division of the story between the setting and the episode is defined by an ALLOW relation. In a sense, the setting sets the stage for the episode. The first level of information category in the episode is the initiating event. This category includes some form of event or action that signals a change in the story which in turn

Table 1

Example of a Single Episode Story with Story Category Descriptions

Setting: Introduces the protagonist; normally includes information about the physical, temporal, or social context of the story.	Once there was a fish named Albert.
Allow Relation	
Initiating Event: An event or action that signals a change in the story which in turn initiates a response in the protagonist.	One day Albert spotted a big juicy worm on top of the water.
Initiate Relation	
Internal Response: An emotion, cognition, or goal of the protagonist.	Albert decided to catch the worm for his friend.
Motivate Relation	
Attempt: The protagonist's overt actions to obtain a goal.	So he bit into it.
Then or **Result Relation**	
Consequence: An event or action that marks the protagonist's attainment or nonattainment of a goal, or any other changes in the event sequence resulting from the protagonist's actions.	Suddenly Albert was caught on a fishing hook.
Cause Relation	
Reaction: An emotion, cognition, or action that expresses the protagonist's response to the consequence.	Albert realized that he would never see his friend again.

precipitates a response in the protagonist. This response is defined by the internal response category. These two categories are bound by an INITIATE relation which denotes a direct causal connection.

The internal response refers to the psychological state of the character. This category may include goals, affective states, and cognitions; an internal response serves to motivate the character's subsequent external response. Thus, the MOTIVATE relation, which is causal in nature, connects the internal response category and the external response, known as the attempt category. Within this category fall the character's overt actions to obtain a goal. In turn, this category is connected to the resolution component by either a THEN or RESULT relation depending on whether the relation is temporal or causal. The primary function of the attempt category is to lead to a resolution.

The resolution component consists of the consequence and reaction categories that are linked by the CAUSE relation. The consequence category specifies the attainment or nonattainment of goals, and marks any other changes in the event sequence resulting from the protagonist's actions. The reaction category includes the protagonist's response to the consequences. Although similar to the internal response category, the reaction category differs in that it cannot contain goal statements.

Within each category, including the setting category, are one or more information units or statements. Typically

these have been analyzed in terms of propositions. Stein and Glenn (1979) define a proposition "as a predicator or relational word, usually the verb, and one or more arguments which stand in some specific relation to the predicator" (p. 55). The proposition roughly corresponds to a simple clause.

Propositions are related to one another by one of three types of relations or intra-category connectors: AND, THEN, and CAUSE. The AND relation may describe the relation between two units that co-occur in time or the case where there is no definite or clear temporal sequence between two units. The THEN relation characterizes the situation in which one statement temporally precedes the second, but does not directly cause it. The first statement may, however, supply the necessary conditions for the second statement to take place. The CAUSE relation describes the case in which one statement directly influences the occurrence of the second statement.

This simple story structure is easily extended to more complex stories with multiple embeddings or iterations. In order to account for the relations between episodes, the system of intra-category relations, AND, THEN, and CAUSE, is extended to interepisodic relations. The most common relations used to connect episodes are THEN and CAUSE. According to story grammarians (Johnson & Mandler, 1980; Mandler & Johnson, 1977; Stein & Glenn, 1979), none of these relations need to be stated explicitly in the canonical

story for the story schema supplies the connection between propositions. When guided by the story schema, the language user is supposedly able to infer these relations without attending to local cues (Mandler & Johnson, 1977; Stein & Glenn, 1979).

One of the most important assumptions behind the story grammar framework is that there is an ideal or canonical story structure. The story grammar is the rule system that specifies the canonical sequence of units in the stories, and the manner in which they may be altered, moved, or deleted. The story schema reflects these rules in the organized set of knowledge that consists of a series of expectations about stories, the manner in which the information units are composed, how they are sequenced, and the types of connections likely to occur between the units. Consequently, in addition to the description of the canonical story structure, story grammarians have also attempted to define the permissible "transformations" of story structure. These transformations involve the movement and deletion of particular story categories. However, in adopting such a framework, story grammarians are confronted with the problem of formulating transformational rules that only generate the small set of transformed structures that appear regularly in stories as opposed to all the possible sequences of story structure (Johnson & Mandler, 1980). According to Johnson and Mandler (1980), the criterion for acceptable transformations of story categories is

psychological in nature. It is based on the listener's ability to recover the underlying structure of the story through "minimal inferential processing", a criterion that is obviously difficult to measure. Johnson and Mandler (1980) propose that before a particular surface form can be said to violate a canonical structure, there must be some minimal increase in comprehension time during the processing of the story that has undergone the transformation.

With regard to deletion rules, several story grammarians in their examination of story structure have noted that categories that contain reactions (i.e., internal response and reaction categories) are frequently deleted from stories (Johnson & Mandler, 1980; Mandler & Johnson, 1977; Stein & Glenn, 1979). In the Johnson and Mandler story grammar, the complex reaction category (internal response) may be deleted in any episode provided that the beginning category (initiating event) is present. Johnson and Mandler (1980) also permit deletion of the beginning category provided that the source of the character's reaction is obvious, that is, when the complex reaction (internal response) category begins the story.

The categories that may be deleted from stories tend also to be the categories that frequently undergo movement transformations. Several story grammarians (Johnson & Mandler, 1980; Mandler & Johnson, 1977; Stein & Glenn, 1979) have noted that the internal response category (complex reaction) is easily manipulated, in particular, the goal

statements that occur within this category. Johnson and Mandler (1980) specify that goal statements may be placed either before or after the attempt category.

Although proposals have been made with regard to the types of transformations and deletions permitted, the permissibility of a transformation or deletion is dependent upon experimental research that confirms that the transformation does not adversely affect comprehension. Similarly, the validity of the story structure described in the story grammar is dependent upon supporting experimental results. Therefore, the following section will examine the relevant experimental literature on the role of story superstructure in story comprehension.

2.3 Global Coherence in Story Comprehension

2.3.1 Evidence from Adults

There are essentially two thrusts to the empirical research on story comprehension. One compares the comprehension of canonical and noncanonical structures in order to investigate the permissible transformational rules for movement and deletion of story categories. The other focuses on the "psychological validity" of the categories. In the empirical work on the comprehension of canonical and noncanonical stories, noncanonical stories have been defined as stories that do not conform to the canonical structure outlined in the story grammar. Therefore, any deletion of a

story category, movement of a category from its original position, or reorganization of the story that is not specified in the grammar results in a noncanonical story, which by definition should lead to an increase in processing difficulty. Transformations that do not lead to such an increase are considered permissible transformations within the story grammar.

In the experimental literature, several types of noncanonical stories have been used: (a) randomized stories in which individual statements of categories are randomly scrambled (McClure, Mason, & Barnitz, 1979; Stein & Glenn, 1978, 1982; Stein & Nezworski, 1978a; Thorndyke, 1977); (b) interleaved stories in which the categories of two episodes are interwoven (i.e., the initiating event of episode one is followed by the initiating event of episode two, followed by the internal response of episode one, then the internal response of the second episode and so on) (Mandler, 1978; Mandler & DeForest, 1979); (c) stories in which one or more story categories have been moved to another position in the story (Haberlandt, 1980; Mandler & Goodman, 1982; Stein & Glenn, 1978; Stein & Nezworski, 1978a, 1978b); and (d) stories in which one or more categories have been deleted (Stein & Glenn, 1978; Thorndyke, 1977).

The techniques used to move particular sentences within a story affect the local coherence and macrostructure of a story in addition to the story superstructure. A canonical story, corresponding to the story structure outlined in the

story grammar, is both globally and locally coherent. By contrast, a noncanonical story violates some aspect of the story grammar, and therefore, is by definition not globally coherent. In their efforts to create various types of noncanonical stories, story grammarians have assumed that only the superstructure of the story is disrupted when sentences or units of information are moved within a story. However, the movement of statements may disrupt not only the global superstructure, but the local coherence and macrostructure of the story. For example, noncanonical stories in which sentences are either randomly scrambled or purposefully juxtaposed lack both local and global coherence. There are, however, varying degrees of this disruption of local and global coherence. For example, the random scrambling of sentences results in far more disruption of both forms of coherence than the movement of particular sentences in the story. The systematic movement of categories in a two-episode story to create an interleaved version does not disrupt the local and global coherence of a story to the same extent as the random movement of categories. This confounding of the disruption of local and global coherence in stories should be kept in mind in the following review of the experimental literature on adults' and children's story comprehension.

In the studies that used free recall as a measure of comprehension, story grammarians predicted that a story that conformed to the canonical structure would be recalled

better than one that violated the canonical structure because the listener or reader would find it difficult to match the incoming noncanonical story with his/her canonical schema. Consequently, a noncanonical story would not be processed as efficiently as a story that matched the canonical schema. Further, it was hypothesized that the order of basic units in the recall protocol would follow the canonical structure presented. Even when presented with ill-formed structures adults' recall would show regularizations of order or additions of story information because subjects would make the noncanonical input conform to their ideal schema.

In order to assess the differences in the recall of canonical and noncanonical stories, generally three aspects of the recall are considered: (a) quantity of recall: how much of the story is recalled; (b) quality of recall: how accurately the units are recalled, and the nature of the distortions, additions, and omissions of story information; and (c) temporal organization of recall: whether the recalled order conforms to the input order (Mandler, 1978). In general, story grammarians' predictions have been supported by several studies on adults' free recall of stories (Mandler, 1978; Mandler & DeForest, 1979; Mandler & Johnson, 1977; Stein & Nezworski, 1978a; Thorndyke, 1977). With regard to the quantity of recall, adults recalled less story information when stories were noncanonical (Mandler, 1978; Mandler & DeForest, 1979; Stein & Nezworski, 1978a;

Thorndyke, 1977). Secondly, the quality of recall was also poorer under the noncanonical story condition. Adults produced more distortions and omissions of information (Mandler, 1978). They also added information that was missing from the noncanonical story (Mandler, 1978; Stein & Nezworski, 1978a). Finally, the temporal sequence of recall for canonical stories conformed to the canonical order, and a similar pattern was found in the recall of noncanonical stories, that is, the noncanonical input order was recalled in canonical order. (Mandler, 1978; Stein & Nezworski, 1978a). However, not surprisingly, there were more noncanonical sequences recalled under the noncanonical story condition.

To date, this research has led only to general statements on the permissible deletion or movement of catgories. Only a limited number of studies have heeded Johnson and Mandler (1980) and investigated potential comprehension time differences in the processing of stories that contain permissible transformations as opposed to violations of the canonical structure (Haberlandt, 1980; Mandler & Goodman, 1982).

Haberlandt (1980) reported that when the consequence category of an episode was moved to a point directly after the initiating event, reading times increased at both the point of movement and the point where the consequence category should have appeared. Given that this movement was not linguistically marked to indicate the chronological

sequence of events, Mandler and Goodman (1982) argued that the increase in reading time was not surprising. As a strong test of the ordering rules, Mandler and Goodman (1982) conducted an experiment in which the movements of categories in all stories were signalled by temporal or causal connectives (i.e., *because*, *since*, *but*, *although*). For each story, five versions were created by moving one story category either forward or backward, with the exception of the initiating event and consequence categories which were always moved in the same direction. The results revealed that no matter what category, there was a significant increase in reading time for all movement versions. Therefore, according to Johnson and Mandler's (1980) ease of inferrability criterion, these data indicate that there are no permissible movements of story categories.

Researchers investigating the psychological validity of the story categories have attempted to show that story categories affect comprehension and retrieval (Haberlandt, 1980; Haberlandt, Berian, & Sandson, 1980; Mandler & Goodman, 1982). Haberlandt and his colleagues found that in well-formed multi-episode stories, reading times increased at the episode boundaries. Mandler and Goodman (1982) hypothesized that a similar boundary effect should appear between categories within an episode, if the categories were psychologically valid. They in fact found that reading times were greater at the beginning of a category, then decreased within the category, and increased as the reader

approached the next category boundary.

These results, as well as the results of studies on the processing of canonical and noncanonical stories, provide some evidence for adults' use of superstructure knowledge in the comprehension of stories.

2.3.2 Evidence from Children

Among the earliest work on children's recall of stories was Piaget (1960, 1969) who observed that younger (6-8) children's recall failed to respect temporal order, confused cause and effect relations, was less complete than adults' recall, and exhibited egocentric use of pronouns. Fraisse (1963) also noted that young children confused the correct sequence of events when retelling stories. With Piaget he argued that the temporal inversions in children's recall were due to the children's failure to comprehend temporal, causal, and deductive relations. For some time these results remained largely unchallenged. Then, in a series of studies, Brown and her colleagues attempted to further test Piaget's claims (see Brown 1976 for a complete review). In one set of experiments, Brown and Murphy (1975) presented four-year-olds with either a logical or arbitrary sequence of pictures. In a reconstruction task, the children ordered the logical set significantly better than the arbitrary set. In another study, Brown (1975) suggested that children's failure to recall the correct temporal order of a story could be due to excessive memory demands rather than a

failure to comprehend order. In this study, kindergarteners and second graders were shown sets of pictures that were accompanied by either a logically or arbitrarily sequenced narrative. After seeing the pictures, the children were asked to either recognize, reconstruct, or recall the sequences. Brown (1975) reported that kindergarteners could recognize and reconstruct correct sequences; however, they had difficulty in maintaining the correct order during recall. The second graders performed equally well on all memory tasks. As a result, Brown (1975) suggested that the memory demands of the recall task may pose particular difficulties for younger children. In sum, Brown's experiments demonstrated that children as young as four years of age do comprehend logical relations expressed verbally or pictorially.

The recent surge of research on children's recall of stories has further demonstrated that children between the ages of 4 and 6 years are able to correctly recall canonical stories (Day, Stein, & Trabasso, 1979; Mandler & Johnson, 1977; Stein & Garfin, 1977; Stein & Glenn, 1979). Furthermore, children between the ages of 4 and 12 perform similarly when asked to recall canonical stories (Mandler & Johnson, 1977; Stein & Glenn, 1979). There are, of course, quantitative differences in the recall; older children recall more than younger children. However, with regard to the quality and temporal organization of story recall, younger and older children accurately recall story

categories with a similar frequency, and they also order the temporal and causal sequence of events in a canonical manner.

Mandler and Johnson (1977) found that both children (first and fourth graders) and adults recalled some story categories more frequently than others when listening to canonical stories. The first graders recalled setting, initiating event, and consequence statements well, whereas attempt, internal response, and reaction statements were recalled poorly. The fourth graders and adults produced a similar pattern of recall; however, there was no longer a significant difference between the recall of attempt and consequence statements. Moreover, all three groups recalled the story in the canonical sequence of events. There were no developmental differences in this regard.

Stein and Glenn (1979) reported similar results in their study of first and fifth graders' recall of canonical stories. Although there was a significant difference in the quantity of recall, there was no significant difference in the temporal organization of information recalled. With regard to the quality of recall, there was only one significant difference in the recall of story categories; the internal response category was recalled better by the fifth graders. The category statements most frequently recalled were the setting statements introducing the protagonist, initiating event, and consequence statements. The least frequently recalled were setting statements

describing contextual information, internal response, and reaction statements. Attempt statements fell somewhere in between. In addition, older children tended to make more inferences, and thus added more information to the recall than the younger children.

The results of these studies indicate that children as young as four years are able to recall canonical stories. Furthermore, from a qualitative analysis of their recall, children perform much like adults. Children and adults recall story categories with similar frequencies, and order the story information in a parallel manner. Discrepancies between these data and earlier work by Piaget and Brown is attributed to the noncanonical structure of the stories used in the Piaget and Brown studies (Mandler & Johnson, 1977; Stein, 1979; Stein & Trabasso, 1982). Mandler and Johnson (1977) argued that:

> Because young children have less processing capacity, presenting them with a poorly structured story may draw proportionately more of their processing resources away from the succeeding propositions as they try to account for violations or lack of structure. (p. 142)

Mandler (1978) and Mandler and DeForest (1979) investigated adults' and children's recall of noncanonical (i.e., interleaved) stories to examine how listeners use their canonical schematic knowledge of story structure to recall noncanonical stories. Mandler (1978) reported no significant developmental difference in the quantity of recall between the second and sixth graders, but there was a

significant difference between sixth graders and adults. Although adults and children (i.e., second, fourth, and sixth graders) tended to recall interleaved stories according to the canonical structure (i.e., the interleaved episodes were recalled as separate episodes) the children exhibited a significantly stronger tendency to recall the stories canonically. There were no significant differences among the second, fourth, and sixth graders' tendency to recall the stories canonically. Thus, Mandler (1978) argued that the children relied more heavily on the canonical story schema than the adults did.

The fact that children demonstrated a tendency to recall the stories canonically does not mean that they could not recall the stories in a noncanonical fashion. To test this possibility, Mandler and DeForest (1979) investigated children's and adults' ability to use more than one method of recalling stories. Adults, and children from grades three and six were asked to recall either a canonical or interleaved two-episode story under one of three instructional sets. Although all subjects were able to recall the interleaved stories canonically, they had difficulty maintaining an interleaved order when instructed to do so. Moreover, in this regard, children had significantly greater difficulty than adults. The third graders were virtually unable to recall the stories in any form but canonical.

Stein and Glenn (1978, cited in Stein, 1979) used a different form of noncanonical story in their investigation of children's recall of noncanonical stories. They constructed nine types of noncanonical stories by moving three different categories (i.e., initiating event, internal response, and consequence) to three different locations in a canonical story. For example, the initiating event category was placed either one, two, or three locations away from its normal position in the story. Thus, the initiating event was placed before either the internal response, attempt, or consequence categories (Stein, 1979). Second and sixth graders' recall of these stories was compared to their recall of the canonical versions. The data revealed that in almost all instances, reorganization of the noncanonical stories took place. This reorganization was specific to the category moved as well as the distance it was from its normal position in the story. Further, the recall tended to follow the canonical structure. Although accuracy of recall was affected by the movement of the initiating event and consequence categories, it was not affected when the internal response category was moved. This finding supports the notion that internal response category movement may be an acceptable transformation of story structure. No reference was made to any developmental differences in the children's recall of the noncanonical stories.

In yet another attempt to create noncanonical stories, several researchers have used a reconstruction task in which

children are given a set of scrambled sentences, and asked to order the sentences into a "good story" (i.e., a story that they might tell a friend or read in a storybook) (McClure et al., 1979; Stein & Glenn, 1978). Stein and Glenn's (1978, cited in Stein, 1979) study of 7- and 12-year-olds revealed that when the children's constructed orders were correlated with the order proposed in the Stein and Glenn (1979) story grammar, the results showed a significant positive correlation for both age groups. The mean correlations between the constructed and canonical story versions were .44 for the 7-year-olds and .77 for the 12-year-olds. Clearly, the younger children's constructed stories tended to deviate more from the expected sequence than the older children's stories.

Employing the Stein and Glenn (1978) scrambled sentence reconstruction task, McClure et al. (1979) investigated the effect of varying global coherence on children's ability to order a scrambled set of sentences. Rather than simply scrambling a canonical story, McClure et al. (1979) created two noncanonical story versions in addition to a canonical version, and then scrambled the sentences in these stories. Consequently, the noncanonical stories were deviant because they were not structured according to the story grammar, and because they were scrambled. There were three versions of six different stories: a setting, a conclusion, and a question version. The setting version was structured to approximate a canonical story. The conclusion and question

versions were the noncanonical versions. In the conclusion version, the final statement was transformed into a statement that initiated the story. The question version was formed by either transforming the initial statement into a question or by simply placing a question before the original first sentence. In an a posteriori comparison of these three versions with the story grammar of Stein and Glenn (1979), McClure et al. (1979) reported that there were numerous differences (in addition to those created) in the number of categories expressed per statement, and in the order of the statements across all six stories. These differences resulted because when the experimenters created the stories they did not control for the type and number of story categories, and the number of statements expressed per category. Moreover, they failed to initially construct the stories in terms of the Stein and Glenn (1979) story grammar.

Children from the third, sixth, and ninth grade were asked to read a set of scrambled sentences and then to order them in the "correct sequence." Several developmental trends were observed. First, there was a consistent improvement across the grades in children's ability to sequence a story correctly. The pattern of improvement varied across the three versions. Overall the children did best on the setting version and worse on the question and conclusion versions. However, this pattern did not hold across all six stories. This may have been as a result of

the differences found across the stories in the a posteriori analysis, leading one to believe that the stories were poorly constructed. The results of the Stein and Glenn (1978) and McClure et al. (1979) studies suggest that younger children are not as proficient at reconstructing scrambled stories.

To date, the research on children's use of story superstructure knowledge in the comprehension of stories has produced several interesting results. The data reveal that children are able to recall canonical stories, and do so in a manner similar to adults. Both adults and children tend to recall particular story categories with similar frequencies, and correctly order temporal and causal event sequences when presented with canonical stories. However, both adults and children perform worse on recall tasks when given noncanonical stories. More specifically, they recall less information, the quality of information is poorer, and the temporal and causal sequence of events presented is disrupted in recall. Moreover, children perform worse than adults in this regard, and younger children worse than older children. With regard to children's performance on reconstruction tasks, younger children have more difficulty ordering a sequence of sentences into a globally coherent story.

Several hypotheses have been proposed in order to account for these developmental differences: (a) younger children are more dependent on the canonical schema than

adults (Mandler, 1978; Mandler & DeForest, 1979), (b) younger children are less familiar with deviant story structures (Mandler & DeForest, 1979), and (c) the memory demands in the recall and reconstruction of noncanonical stories are excessive for younger children (Mandler & Johnson, 1977; Stein & Trabasso, 1982). At present, there is not sufficient evidence to support one of these hypotheses over another.

It is important to recall that the noncanonical stories used in these experiments with adults and children lacked both local and global coherence. Therefore, the difficulties that adults and children had in recalling or reconstructing these stories may not simply be the result of a mismatch between incoming story information and the listener's canonical story schema. It may also be a result of the decrease in local coherence, and the increased processing needed to resolve local as well as global incoherence. Moreover, given the fact that children did worse than adults, it is difficult to determine exactly where the children were having difficulty.

Some light could be thrown on this confusion by investigating adults' and children's comprehension of stories that are locally coherent but noncanonical from the story grammar perspective. Such a story could be created by moving story category statements, but then linguistically marking these movements so that the chronological sequence of events is clear. These movements could be marked with a

cohesive tie such as conjunction, that is, connectives. Despite the noncanonical sequence of the story categories, the listener/reader may be able to retrieve the chronological sequence of events by way of the cohesive ties that make explicit the relations. Research on adults' and children's comprehension of these stories would provide more information about the function of local coherence when the superstructure of the story is disrupted, as well as whether adults and children make use of cohesive ties, such as conjunction, to comprehend stories that are not chronological. The manner in which the linguistic system can mark these relations, and make clear the underlying sequence of events in a story structure, is the topic of the following section on local coherence in story structure.

2.4 Local Coherence in Story Structure

An excellent example of research on the nature of local coherence in discourse structure, and the manner in which language signals these semantic relations (i.e., cohesion) is the work of Winter (1968, 1971, 1983). Winter has attempted to treat discourse as the product of semantic relations holding between sentences. The fundamental premise of his work is that discourses are built up of multiple layers, and that each layer provides information about the succeeding layers. The number of discourse patterns is built from a finite set of relations and is signalled in a finite number of ways. In order to quantify

and characterize the nature of discourse patterns, Winter proposed that one begin with a finite set of lower level units, "clause relations", and then determine how these combine to form a discourse pattern (Hoey, 1983).

Winter defined the clause relation as the "cognitive process whereby we interpret the meaning of a sentence or group of sentences in the light of its adjoining sentence or group of sentences" (cited in Hoey, 1983, p. 18). The notions of clause and sentence are conflated here so that sentence also includes parts of sentences. Similarly, the term "adjoining" characterizes the most likely position of related clauses, but it need mean no more than within the same discourse. The clause relation does not simply signal relations between clauses. Rather, the term "clause" is used because the clause is the basic unit upon which relations are built (Hoey, 1983).

The most obvious means of signalling the clause relation in Engish is by the use of one of the two sets of grammatical connectives: the subordinators and the conjuncts. Subordinators are markers of a linkage between two linguistic units wherein one unit is dependent upon the other, and is usually a constituent of the other (in English, e.g., although, because, before, after). Conjuncts are markers coordinating two linguistic units that are equivalent, that is, one unit is not subordinate to the other (in English, e.g., and, but, or) (Crystal, 1985). The early work of Winter (1968) focused on the use of these

connectives in signalling clause relations. He described how these devices are used to signal relations, and the alternative methods of linguistically marking the same relations.

The interaction between clause relations and the connectives that signal them can be demonstrated through a minimum discourse. The following example is an adaptation of one devised by Winter (cited in Hoey, 1983).

1.1 I was on lifeguard duty.
I saw her struggling in the water.
I threw her a ringbuoy.
I saved her from drowning.

These four sentences could quite easily translate into a minimal canonical story structure. The first statement corresponds to a setting, and the latter three to a behavioural sequence consisting of an initiating event, attempt, and consequence respectively.

If these four sentences are manipulated in every possible way, the end result is 24 different sequences. However, the degree of acceptability for these sequences varies considerably. Some of the sequences are totally deviant.

1.2 I saved her from drowning.
I threw her a ringbuoy.
I saw her struggling in the water.
I was on lifeguard duty.

Some sequences become more acceptable when specific statements are given a parenthetical form of intonation. Nonetheless, this is a linguistic cue signalling the

relations between the sentences, thus making explicit the correct sequence of events.

1.3 I saw her struggling in the water.
(I was on lifeguard duty).
I threw her a ringbuoy.
I saved her from drowning.

When all the statements are given equal importance and neutral intonation there is but one sequence that is completely acceptable. This is the sequence outlined in 1.1.

Without any linguistic cues to tie these sentences together, the only completely acceptable version is one that follows a chronological or real-time sequence. Yet language enables us to describe events in patterns that do not necessarily mirror the chronological sequence. Cohesive ties enable the speaker to make many more of these 24 sequences acceptable to the listener because the clausal relations of the event sequence are made explicit. Deviant sequences become less deviant, or acceptable when connected with the appropriate subordinators or conjuncts. So, for example, sequence 1.3 may become:

1.4 I saw her struggling in the water
while I was on lifeguard duty.
I threw her a ringbuoy.
I saved her from drowning.

By the same token, when connected by subordination the deviant sequence in 1.2 becomes acceptable.

1.5 I saved her from drowning by throwing
her a ringbuoy when I saw her struggling
in the water while I was on lifeguard duty.

On a scale of acceptability this sequence is far more acceptable than 1.2. If the sequence were chronological as well as linguistically connected, one would expect it to be even more acceptable. Both factors may contribute to the acceptability of the sequence.

Subordination is the means of making explicit in an altered sequence that which is implicit in the chronological sequence (Hoey, 1983). In the case where the sequence is chronological (i.e., 1.1), the use of subordination to connect the statements results in the following minimum discourse:

1.6 While I was on lifeguard duty, I saw her struggling in the water so I threw her a ringbuoy. I (thereby) saved her from drowning.

If sequence and subordination were complementary, then one might argue that the chronological sequence does not require subordination. However, the version that incorporates cohesive ties is closer to what a native English speaker might use than the staccato structure of 1.1. Version 1.1 provides the bare bones of the structure, whereas 1.6 explicitly clarifies the relations.

Another more common way of expressing relations in a chronological sequence is through the use of sentence conjunctions, as in 1.7. A subordinator cannot connect the final statement in 1.6, whereas a conjunct can. Conjuncts generally express relations in chronological sequences; subordinators make them explicit in deviant sequences.

1.7 I was on lifeguard duty.
Just then I saw her struggling in the water.
Therefore, I threw her a ringbuoy.
Consequently, I saved her from drowning.

As illustrated, connectives preserve the local coherence and global meaning (macrostructure) of the story structure and also make explicit the sequence of temporal and causal events in both chronological and deviant story structure. Several researchers have considered the effect of connectives on adults' and children's comprehension of noncanonical (i.e., nonchronological) stories. A review of this experimental work follows in the next two sections.

2.5 Local Coherence in Story Comprehension

2.5.1 Evidence from Adults

A limited amount of experimental research has been conducted on local coherence, and the role of connectives in adults' story comprehension (Baker, 1978; Mandler & Goodman, 1982; Townsend; 1983) despite numerous speculations concerning their importance in story processing (Carpenter & Just, 1977a, 1977b; van Dijk & Kintsch, 1983; Johnson & Mandler, 1980; Mandler & Johnson, 1977; van Dijk, 1985).

For example, Mandler and Johnson (1977) and Johnson and Mandler (1980) hypothesized that the causal relations between categories need not be specified in the surface structure of canonical stories because they will automatically be inferred by the listener/reader. But when the story is noncanonical (i.e., as a result of the movement

of story categories) the relations between the moved categories must be explicitly marked by a connective if the listener/reader is to retrieve the canonical underlying structure. Neither hypothesis was empirically investigated.

Carpenter and Just (1977a, 1977b) considered the relationship between the use of various cohesive devices in discourse and the ability to integrate sentences and make appropriate inferences. With regard to the role of connectives in canonical structures, they speculated that:

> In the case where the connective does not appear in the text, the reader must infer the relationship between the sentences by drawing on his knowledge of the referential situation. The integrative process should be shorter in duration when connectives do appear and thus make the inference process unnecessary. (p. 235)

Again, these predictions were not subjected to experimental verification.

In their work on strategies of discourse comprehension, van Dijk and Kintsch (1983) and van Dijk (1985) have emphasized the important role that connectives may play in establishing local coherence in text. When a listener is attempting to establish coherence between a previous utterance and an incoming one, there is a built-in assumption that the next sentence denotes the next actions or events in the story. If this is not the case, then this must be explicitly signalled by appropriate linguistic devices (i.e., tenses, adverbials, or connectives). Van Dijk (1985) argued that:

> In less clear cases appropriate connectives must signal the particular relation between the predicate (new FACT) and the previous FACT...Strategically, connectives are very important...and the connectives, all other things being equal, are the most effective signals for the nature of this relationship between facts. (p. 41)

It has been suggested that connectives may be more important during the processing of noncanonical text than in the processing of canonical text. As Mandler and Johnson (1977) have suggested, in the former case, the listener/reader must retrieve the chronological sequence in order to comprehend the story. Without these connectives to signal the chronological sequence, it is more difficult for the listener/reader to construct a globally coherent sequence of events. When the story is canonical, the chronological sequence of events is inherent in the temporal organization of the discourse: connectives merely make these relations explicit.

In a series of experiments, Baker (1978) examined the effect of the input sequence on memory for simple stories. After reading stories in either a chronological or flashback sequence that was marked by connectives, adult subjects made a decision about the real order of occurrence of two events in a recognition task. Response times were faster and more accurate under the chronological sequence. However, when stories contained flashbacks, decisions were easier about the input order than the chronological order. Baker (1978) concluded that subjects preserved some information about input order in their memory representation, arguing against

a strong schema-based approach to memory. According to a strong schema-based theory, subjects would construct a canonically ordered (i.e., chronological) representation of event order during processing, ignoring lower-level information about the input order. Unfortunately, a third type of story sequence, flashback without connectives, was not used. Without such a comparison it is difficult to ascertain the role of the connectives in the processing of these stories.

Earlier, in the section on global coherence in story comprehension, the Mandler and Goodman (1982) study was reviewed. In this study, stories were created by moving particular story categories and marking them with connectives (i.e., *because*, *since*, *but*, *although*). When adults were asked to read these stories, there was an increase in reading time no matter what category was moved. In itself this result does not tell us much about the effect that the connectives had on reading time. If another condition that did not mark these movements had been used, the effect of the connectives could have been better assessed. One would expect an even greater increase in reading time when connectives are absent.

Townsend (1983) investigated the semantic relations between clauses in complex sentences and sentences in text. In a series of eight experiments on adults' processing and retention of both isolated complex sentences and sentences in narratives, he demonstrated that the meanings of

connectives and the ordering of events in the sentences and texts affect sentence processing time and recall. Specifically, he found that a match between input order of events in the narrative and the underlying (i.e., chronological) temporal pattern reduces reading time. The presence of connectives, within and across sentences, helped the listener/reader to construct the causal chain. However, integration was easier when the connective signaled that the propositions would appear in the expected causal/temporal pattern, than when the connective signaled a disruption of this pattern. As in the other two studies, these experiments did not compare these narrative versions with versions that did not follow a chronological sequence and lacked connectives. In the latter case, one would expect even slower reading times because the listener would have difficulty establishing local coherence and ultimately a coherent macrostructure without the aid of connectives to signal changes in the narrative structure.

Given the limited empirical research addressing the question of the role of connectives in adult story comprehension, it is difficult to draw any firm conclusions about the manner in which the presence or absence of connectives, and the corresponding increase or decrease of local coherence in noncanonical stories interacts with the processing of story superstructure. It does however appear that two factors are important in the processing of story information: (a) the manner in which the events are

sequenced, and (b) the way in which connectives signal nonchronological sequences.

2.5.2 Evidence from Children

In the empirical literature on children's comprehension of stories, a few investigators have considered the importance of local coherence and the role of connectives in the recall and reconstruction of noncanonical stories (Bischofshausen, 1985; McClure et al., 1979; Stein & Glenn, 1982; Stein & Nezworski, 1978b). Of these studies, one was never completed for publication (Stein & Nezworski, 1978b, personal communication) and another used poorly constructed stories (McClure et al., 1979).

Bischofshausen (1985) extended Baker's (1978) study, investigating whether 6- and 8-year-old children differed from adults in their ability to maintain verbatim input order in memory tasks. She created flashback versions of four different stories by moving the "crucial event" and marking the movement with the temporal connective *before*. These four different stories varied in length and complexity of story structure. Subjects were asked to recall this flashback version under an immediate and a 24-hour delayed recall condition according to instructions that were either vague or specifically required them to recall the story verbatim. Following the delayed recall, a picture-sequencing task was given to determine whether picture cues would enable subjects to demonstrate an awareness of input

order, even though they might have reordered events during recall. Bischofshausen (1985) reported that 24-hour delayed recall resulted in significantly more reordering of story events presented out of logical sequence through the use of *before* than did immediate recall. This trend was observed in adults as well as children. In the picture sequencing task, age differences were found in the ability to demonstrate awareness of input order. Adults benefited from these cues significantly more than children did. The children's picture sequencing responses were similar to their recall in terms of the number of reorderings. However, a majority of all responses in any task were not reordered: no more than 56% of the stories displayed reordering at any stage.

With regard to the function of the connective *before*, a significant developmental difference was found for the number of stories in which the temporal connective *before* was used to maintain the input order of events during immediate recall: more 6-year-olds omitted the connective than 8-year-olds, who omitted more than adults. In fact, half or more of all subjects omitted *before* on immediate recall. These differences were no longer significant in the 24-hour recall condition. The exact relationship between those individuals who omitted *before* and either did or did not reorder the temporal sequence was not systematically investigated. However, Bischofshausen (1985) did note that some individuals who did not temporally restructure the

order of events in the story and omitted *before*, semantically restructured story information so that it followed a logical sequence. There were more such reorderings for the children than adults.

McClure et al. (1979) and Stein and Glenn (1982) used a reconstruction rather than recall task. Earlier, the McClure et al. (1979) study was mentioned with regard to their findings on children's use of story grammar knowledge in reordering scrambled stories. With regard to local coherence, McClure et al. (1979) observed that in the reordering of sentences, children violated rules for pronominalization, sequence of tenses, and ellipsis, as well as for the use of deictics and connectives. These rules were violated in the sequencing of canonical and noncanonical story versions. McClure et al. (1979) interpreted this to mean that children ignored the surface cues because they were operating at the level of the propositional content of the stories. Nevertheless, the inability to attend to these cues affected their ability to correctly sequence canonical and noncanonical stories. Furthermore, McClure et al. (1979) based these conclusions on a limited set of linguistic cues in the stories, and as a result of the limited data base, did not statistically investigate an apparent developmental trend in children's ability to attend to linguistic cues in the sequencing of stories. Given the absence of statistics on children's ability to attend to linguistic cues, and the poor

construction and control of the stories as noted earlier, the results of this study should be interpreted with caution.

Stein and Glenn (1982) investigated children's ability to reconstruct a good story from the scrambled sentences of two types of stories. Under one story condition, (markers-deleted version) all pronominal references at the beginning of statements were removed, and no temporal connectives were included. The other story condition (standard version) included these markers, and was essentially a typical canonical story as used by story grammarians. Stein and Glenn (1982) asked second and sixth graders to order the scrambled versions of these stories into a good story. The results showed significant developmental and story condition differences. Mean correlations between the expected canonical order of events and the children's sequencing of events under the two noncanonical versions were computed. In the standard version, the mean correlations were .68 for the second graders and .94 for the sixth graders, whereas in the markers-deleted version, the mean correlations were .47 and .80 respectively. Under both conditions, the sixth graders' sequences more closely resembled the canonical form of the story than the second graders' sequences. Moreover, the addition of the linguistic markers significantly increased the probability that both second and sixth graders would construct the story in a canonical fashion.

Stein and Glenn (1982) also investigated the nature of the inversions that occurred in the children's reconstructions of the stories. In both conditions, the inversions primarily involved alternative orderings of either the internal response or reaction statements. A further analysis of the children's reconstructions of the markers deleted version also indicated that many of the reorderings occurred within the category. The lack of pronominal reference and temporal markers "lessened the certainty by which the exact temporal and causal constraings (sic) could be inferred" (Stein & Glenn, 1982, p. 267). The addition of the markers in the standard version constrained the possible sequence of events; thus children were better able to order the sentences in the canonical fashion.

In addition to these transformations that did not severely change the logical order of events, the second graders also inverted sequences that violated the canonical sequence. The data indicated that younger children often constructed strings of logical, locally coherent sequences, and then tacked on the remainder of statements in any order. Stein and Glenn (1982) suggested that this may be as a result of excessive memory demands, and that second graders are not able to attend to all the necessary cues when reconstructing a story. According to Stein and Glenn (1982), "under conditions where working memory is taxed. (sic) young children may operate upon a smaller number of units in the given sequence and infer the appropriate

logical relations only within a smaller set of events" (p. 268). As a result, their reconstructions would exhibit many more inversions, although the individual events would be ordered appropriately. It might also be argued that in such a task, younger children focus primarily on local coherence and are unable to connect these locally coherent units into a larger globally coherent unit.

Stein and Nezworski (1978b, cited in Stein, 1979) conducted an experiment on the effect of "rhetorical markers" on 6- and 10-year-old children's recall of noncanonical stories. Very little information was given about the study, and virtually no information about the types of linguistic markers used to signal the movement of story statements. The one example of a linguistic marker given is the phrase *this happened because* (Baker & Stein, 1981; Stein, 1979). Story versions were created by moving statements in three categories (i.e., internal response, consequence, and reaction) to different positions in the story. Then, rhetorical markers were added to signal these movements (marked movement). The children recalled canonical and marked movement story versions.

A comparison of the recall of the two story versions yielded significant developmental differences. The fifth graders recalled as much information from stories containing marked inversions as from the canonical stories. Furthermore, three stories containing marked inversions of either the internal response or reaction categories were

recalled better than the canonical sequence. In contrast, the first graders did not show this same pattern of recall. The noncanonical version was never recalled better than the canonical, and only a few stories were recalled as well as the canonical. With regard to the order in which stories were recalled, transformations did occur so that the recall often matched the canonical sequence; however marked inversions were also recalled in their presented order for both groups.

This admittedly sketchy evidence stands in contrast to the results on adults' and children's recall of noncanonical stories in which noncanonical stories were always recalled more poorly than canonical stories. Although the marked movement story version is noncanonical according to the story grammar, the restoration of local coherence appears to have played an important role in the older children's processing of these noncanonical stories.

The developmental difference in children's recall suggests that the first graders may not be processing marked movement story versions in the same way as the fifth graders. A child's ability to retain information from a marked movement story requires that the child possess sufficient knowledge about the function of specific linguistic cohesive devices that mark the chronological sequence of events as well as strategies that facilitate the encoding of information that is other than chronological (Stein, 1979). When listening to or reading a story that is

not chronological, a child must first realize that the information in the story does not follow the real-time sequence. In order to do this, the child must understand the role of the linguistic devices that mark these movements. In turn, the child must somehow make note of this movement, so that the entire sequence of events in the story can be reconstructed. The performance of the older children in recalling the marked movement story versions in the Stein and Nezworski (1978b, cited in Stein, 1979) study suggests that they recognized the function of the cohesive devices in signaling a nonchronological sequence of events, and that they were able to construct and encode a representation of the stories. Exactly how the children encoded the information is not known, but their performance implies that they were able to encode and recall the information in these stories as well as the canonical versions. This finding alone suggests that although the superstructure was disrupted in these stories, the restoration of local coherence was sufficient to improve the fifth graders' recall to the extent that it was comparable to their recall of the canonical stories where the superstructure was intact.

The question as to why the younger children were unable to perform as well as the fifth graders in recalling marked movement story versions remains unanswered. There are at least two possibilities; (a) the younger children were unfamiliar with the function of the cohesive ties, or (b)

they were less able to recall nonchronological story information. If they were less able to recall nonchronological story information this would provide support for the hypotheses that younger children are either (a) more dependent upon the canonical schema or (b) less familiar with deviant story structures. On the other hand, if the first graders did not grasp the function of these linguistic markers, then the difference Stein and Nezworski (1978b, cited in Stein, 1979) found might also be attributed to the younger children's lack of knowledge about the connectives and their function within the noncanonical story.

Empirical research on children's comprehension of temporal and causal connectives in a non-discourse context has shown that children younger than 7-8 years of age often fail to understand sentences with *because*, interpreting it as either *and* or *then* (Bebout, Segalowitz, & White; Corrigan, 1975; Emerson, 1978; Johnson & Chapman, 1980; Kuhn & Phelps, 1976). As far as children's comprehension of the connectives *before* and *after* is concerned, researchers have found that children younger than 6-7 years of age do not consistently comprehend sentences with these connectives (Amidon, 1976; Amidon & Carey, 1972; Barrie-Blackley, 1973; Clark, 1971; Clark & Clark, 1968; Coker, 1978; Ferreiro & Sinclair, 1971; French & Brown, 1977; Johnson, 1975). Trosberg (1982) reported that the temporal connectives *before* and *after* pose considerable comprehension problems

for children between the ages of 3 and 6 years when children must rely exclusively on the connectives in order to interpret event order. In light of these findings, it is important that any study investigating younger children's comprehension of marked movement stories verify that the children are able to comprehend the connectives in question to avoid confounding children's comprehension of the connectives that mark movements with their ability to recall nonchronological story information.

The results of these studies suggest that connectives may play an important role in children's reconstruction and recall of stories. In the majority of cases, when children are asked to recall stories in which temporal sequences have been reversed and marked by a connective, children do not reorder the sequences (Bischofshausen, 1985). Stein and Glenn (1982) showed that linguistic markers, such as temporal connectives, constrain the possible sequence in which sentences can be ordered, thereby increasing the probability that scrambled stories will be correctly reconstructed. Subjects were able to use these markers to correctly sequence the sentences. The Stein and Nezworski (1978b, cited in Stein, 1979) study suggests that children are able to use their knowledge of local coherence and connectives to recall marked movement stories as well as canonical stories. However, developmental differences in children's ability to use this knowledge were found. Younger children were not as proficient at recalling and

reconstructing stories that included connectives. Clearly, this research provides ample support for further study of the role of connectives in children's comprehension of stories, and the strategies children use in comprehending canonical and noncanonical stories.

2.6 Motivation and Objectives of the Present Study

The primary motivation for this study was the absence of any significant experimental research on the role of linguistic knowledge in story comprehension. In the literature on story comprehension, investigators have focused on the global aspects of story structure - story grammars and schemas. As a result, the lower level components of story structure, local coherence and linguistic cohesion, have been ignored. This tendency resulted in an oversight wherein experimenters failed to recognize that the disruption of the story superstructure usually results in a concomitant disruption of local coherence, and thus also the macrostructure. This led to a confounding of the effects of decreased local and global coherence in studies on adults' and children's comprehension of noncanonical stories. Story grammarians have argued that adults and children process noncanonical stories more poorly than canonical stories because noncanonical stories do not match their canonical story schema, or their expectations about story structure. However, the difficulty involved in processing these stories may be more complicated because

both forms of coherence are disrupted.

In order to better understand the knowledge and processes involved in comprehending canonical and noncanonical stories, it is necessary to create stories that vary in their degree of local and global coherence. In order to investigate explicitly the role of local coherence in children's story comprehension, stories that are locally coherent, but noncanonical (i.e., not globally coherent in terms of superstructure) according to story grammar structure would also need to be used. These stories would in turn have to be compared to stories that lacked or possessed both forms of coherence.

In light of this, three story organization conditions, characterizing varying degrees of local and global coherence in story structure, were used in this study: canonical, unmarked movement, and marked movement.[1]

1. The first condition, canonical, adheres to the story grammarians' notions of canonical structure in terms of the organization of story information. Thus, the canonical version is both locally and globally coherent.
2. The second condition, unmarked movement, is created by moving particular story category statements in the story to create a noncanonical story, without marking these movements linguistically. This condition is therefore

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[1]The logical fourth condition is one in which the story is globally coherent, but not locally coherent. Such a condition would obviously be impossible to create. Therefore it is clear, although often taken for granted, that local coherence and the cohesion of story structure is fundamental to the global coherence of the story.

lacking in both local and global coherence.

3. The third condition, marked movement, is identical to the second except that the movements of the story category statements are marked by connectives so that the local coherence between statements is preserved. This version lacks coherence of superstructure because the movement of catgories violates the story grammar structure. On the other hand, the macrostructure of the story is coherent because the connectives that link the statements together enable the listener to create a coherent global meaning of the story.

This study is an experimental investigation of the role of local and global coherence in: (a) children's verbatim recall of canonical, marked movement, and unmarked movement stories; and (b) children's responses to comprehension questions on the information in these three types of stories. Both measures were used in this study because it has been suggested that free recall alone is not an accurate measure of children's comprehension (Omanson et al., 1978; Voss, Tyler, & Bisanz, 1982). Moreover, the use of these two measures provided more information about the function of connectives and the role of local coherence in children's story comprehension.

The children chosen for this study were in grade six and between the ages of 10 and 12. There were two reasons for choosing this particular age group of children: (a) these children were older than the age group of children

(3-7 years) reported to have difficulty comprehending connectives in a non-discourse context, and (b) many of the previous studies on story comprehension have included grade six children.

The following research questions are based on the assumption that the degree of local and global coherence in a story will affect: (a) the quantity, quality, and temporal organization of the recall of the stories; and (b) the number of correct responses to comprehension questions on the story's content.

1. Are there significant differences in sixth graders' verbatim recall of canonical, marked movement, and unmarked movement stories? If the linguistic devices (i.e., connectives) that contribute to local coherence facilitate processing, one would expect marked movement story versions to be recalled significantly better than unmarked movement stories (marked movement > unmarked movement). If the global coherence of the canonical sequence of story categories facilitates processing, one would expect canonical stories to be recalled significantly better than both the marked and unmarked movement story versions (canonical > marked movement > unmarked movement). More specifically, are there significant differences in the quantity, quality, and temporal organization of story information recalled for these three story versions?

2. Are there significant differences in the number of

correct responses to comprehension questions by sixth grade children for canonical, marked movement, and unmarked movement stories? If the connectives that contribute to local coherence facilitate comprehension, one would expect a significantly greater number of correct responses to these questions for marked movement stories than for unmarked movement stories (marked movement > unmarked movement). Moreover, if the global coherence of the canonical sequence of story categories facilitates comprehension, one would expect the number of correct responses to be significantly greater for the canonical stories than for both the marked movement and unmarked movement stories (canonical > marked movement > unmarked movement). However, if the connectives that signal changes in the superstructure of the story are sufficient for the comprehension of the story, then one would expect no significant difference between the number of correct responses to the comprehension questions for the canonical and marked movement story versions (canonical = marked movement). This outcome is not expected in the verbatim recall of these stories because although the listener may have comprehended the marked movement story version as well as the canonical, the listener is still required to recall the story as it was heard, and this may involve greater memory demands when the sequence of story information is not chronological.

3. THE EXPERIMENT

3.1 Introduction

This chapter is devoted to the description of the experiment that was conducted to investigate the effect of varying the local and global coherence of story structure on sixth grade children's story comprehension.

The two operational hypotheses were formulated as follows:

> *Hypothesis 1*: Sixth graders' recall of canonical stories should be significantly better than their recall of marked movement stories which in turn should be significantly better than their recall of unmarked movement stories.
>
> Canonical > Marked Movement > Unmarked Movement

> *Hypothesis 2*: The number of accurate responses to comprehension questions by sixth grade children should not differ significantly among canonical and marked movement stories, but the number of accurate responses for each of these two stories should be significantly greater than for the unmarked movement stories.
>
> Canonical = Marked Movement > Unmarked Movement

3.2 A Measure of Comprehension

One of the problems associated with research on story comprehension is the fact that it is impossible to separate comprehension and memory effects (Voss et al., 1982). In order to comprehend a linguistic unit such as the story, it is essential to remember information that appeared earlier in the story, and to integrate this information with

subsequent information. For the experimenter then, the choice of an appropriate measure of comprehension is a dilemma. Virtually all the measures that have been used to date make some form of memory demand on the subjects. Consequently, a subject's poor performance may indicate either poor comprehension or poor memory.

Research on story comprehension has primarily used free recall as a measure, but other measures such as probed recall, recognition, and reconstruction have been used. The assumption behind memory tests as an index of comprehension is that poorly comprehended material will be poorly recalled. This hypothesis has been indirectly supported by the work of Bransford and Johnson (1972) and Thorndyke (1977) which showed that there is a relationship between the amount of information recalled from a text and subjects' ratings of its comprehensibility.

In this study, the recall measure will be viewed as a measure of recall and not necessarily of comprehension. The comprehension question task places fewer memory demands on the subject and is viewed as a more direct measure of comprehension.

3.3 Subjects

A total of 72 grade six students chosen from four elementary schools (one classroom per school) in Edmonton, Alberta participated in the experiment. The age range was from 10;10 to 11;11, and there were 34 males and 38 females.

The socioeconomic status of the children varied. All children whose parents consented to their participation, and who met the following criteria were included in the study: (a) they were native English speakers, (b) they had never failed a grade, and (c) they were not receiving remedial help in the language area of the curriculum. The children's respective teachers established whether the children met the above criteria.

3.4 Materials

3.4.1 Stories

Two simple two-episode stories, "Jennifer and Tom have some bad luck" and "Susan and Peter explore a forest", each containing eleven basic story categories, were created to exemplify an ideal or canonical story in the Stein and Glenn (1979) grammar. Each story has a common setting category followed by two temporally connected episodes. The episodes are connected by the temporal connective *meanwhile*. In both stories the events of the two episodes are united by a common setting wherein the protagonists of the respective episodes are introduced. Each category contains one statement.

Although the two stories differ in theme and content, they are structurally very similar. The stories were constructed such that the number of words in the category statements and the complexity of their syntactic structure

were controlled across the two stories. The total number of words in the canonical versions of the test stories was 91 and 92, respectively. Moreover, the number of words per statement within each of the two stories was also controlled. The syntactic structure of the statements was controlled by ensuring that the statements followed the same subject-predicate structure. More specifically, if a statement in story 1 had a NP V PP structure, then the statement for the same category in story 2 mirrored that structure. Moreover, if the statement in story 1 contained a relative clause structure, then the corresponding statement in story 2 mirrored that as well. A comparison of the canonical versions of the two stories appears in Table 2. The number of words per category statement and the syntactic structure of the statements can be easily compared in this table.

Each canonical story version was then altered to create two other story conditions: marked movement and unmarked movement. Both of these versions are a form of flashback story wherein the consequence category statement of an episode is moved before the initiating event category statement of the same episode. In this way, the outcome or result of the story is made known before the rest of the story. The events leading to the consequence appear afterwards. The consequence categories of both episodes were moved in this manner.

Table 2

Comparison of Stories 1 and 2

Setting
ST1 One day both Jennifer and Tom had some bad luck.
ST2 One day both Susan and Peter were exploring a forest.

Intitiating Event
ST1 Jennifer lost her dog in the park.
ST2 Susan heard a noise in the bushes.

Internal Response
ST1 Jennifer was determined to find her dog.
ST2 Susan was determined to investigate the noise.

Attempt
ST1 So she searched around the neighbourhood.
ST2 So she crawled into the bushes.

Consequence
ST1 Then Jennifer saw her dog digging in a garbage can.
ST2 Then Susan found a baby bird chirping on the ground.

Reaction
ST1 Jennifer knew that she would have to give her dog a bath.
ST2 Susan knew that she would have to take the baby bird home.

Initiating Event
ST1 Meanwhile, Tom was sick in bed.
ST2 Meanwhile, Peter was hiking up a hill.

Internal Response
ST1 But Tom wanted to ride his bicycle.
ST2 But Peter wanted to take a rest.

Attempt
ST1 So he snuck out of the house.
ST2 So he sat down under a tree.

Consequence
ST1 Then Tom discovered that his bicycle had a flat tire.
ST2 Then Peter discovered that he was sitting in poison ivy.

Reaction
ST1 Tom thought that he should have stayed in bed.
ST2 Peter was worried that he would get very sick.

In the marked movement version, the movement of this information was linguistically marked by three connectives. First, the temporal conjunction *before this* (connective and referent) was placed at the beginning of the initiating event statements in both episodes in order to mark the correct sequence of events in the story, and the local relationship of the statements. Then the temporal connective *meanwhile*, which was at the beginning of the initiating event statement in the second episode of the canonical version, was moved to the beginning of the moved consequence statement of the same episode. Lastly, the connective *now* was added to the beginning of the reaction statements in both episodes in order to tie the reaction statement to the consequence statement because the two had been separated as a result of the movement. The connective *now* functions as a "continuative"; that is, it does not express any conjunctive relation per se, but it is a cohesive force in the story (Halliday & Hasan, 1976).

By contrast, the movements of story category statements in the unmarked movement version were not marked in any way. No connectives were added to flag the correct sequence of events in the stories. The canonical, marked movement, and unmarked movement versions of both stories appear in Appendix A.

The statements across the three story conditions for each story are identical except for the noted additions of connectives to the marked movement condition, and the

absence of them in the unmarked movement condition. As well, the temporal connective *then* appears in the consequence category of both episodes of the canonical version, and not in either of the other two versions.

The two stories under each of the three story organization conditions were recorded on a Sony Technics M222 cassette recorder (Model TA-AX22) by a female speaker. During the recording of the stories, the reader spoke at a constant rate of speech. In addition to the test stories, a practice story was created to be given to each subject as the first story of the session. This story did not have the same structure as the test stories; it was a simple single episode story with a setting, and the requisite five categories of an episode. Only a canonical version of the story was created. There were two statements per category except for the consequence category for a total of 11 statements. The practice story also appears in Appendix A.

3.4.2 Comprehension Questions

A set of 12 wh-questions was constructed for each of the test stories (i.e., stories 1 and 2), and a set of 8 wh-questions for the practice story. These are found in Appendix B. The same set of questions was used for each of the three story conditions. The questions focused on the information presented in the story category statements. More specifically, one question was structured for each of the story categories except for the setting category for

which two were created. During presentation, the questions were ordered chronologically rather than randomly. As a result, the sequence of questions lead the subject through the actual sequence of events in the story. This mode of presentation was preferred over a random presentation for two reasons. First, in a random presentation it would be difficult to determine when questions either cued or confused the listener in responding to subsequent questions, whereas in a chronological presentation the manner in which one question led into the other was predictable. Secondly, a chronological sequence provided a framework for the listener, and therefore put fewer demands on memory. These questions were written on cue cards, and were read by the experimenter during the testing session.

3.5 Design

Each of the 72 subjects was randomly assigned to one of three different story organization conditions (canonical, marked movement, or unmarked movement) for one of the two stories. The design for the experiment was a 2 x 3 factorial with three story organization conditions and two stories. Both story organization and stories were between subjects factors. There were 12 subjects per cell.

3.6 Procedures

Each subject was tested individually by one experimenter in a quiet location inside the school, but outside of the classroom. At the beginning of each session there was a brief conversational period between the experimenter and the child in order to make the child more comfortable. The children were then told that the experimenter was interested in how people remember stories. The experimenter explained the entire task to the children, and that their responses would be recorded. The verbatim instructions to the children are found in Appendix C. The children were given the opportunity to ask any questions before beginning.

The first story presented to the subjects was the practice story. The subjects were not told that this was a practice story. Both the practice story and the test story were treated in the same manner. The stories were played on a Sony cassette recorder (Model TC-110A) and the subjects' responses were recorded on a Sharp cassette recorder (Model RD-660AV1).

After hearing the first story, the children were asked to count backwards from 100 by threes until the experimenter asked them to stop. The subjects counted backwards for 30 seconds, and the experimenter timed this on a Casio digital wristwatch. After they stopped counting, the subjects were asked to recall the story exactly as they heard it. When they had finished recalling the story, the experimenter

asked them the appropriate set of 12 wh-questions about the story. Then the subjects were asked to listen to the second story, namely the test story. The same procedure was followed for the second story. The entire session lasted approximately 15 minutes.

3.7 Scoring Procedures

3.7.1 Recall Task

Prior to scoring, all the recorded recall protocols were transcribed onto scoring sheets (see Appendix D). These sheets were designed such that for each story condition, the transcriber could, where possible, categorize the recalled statements into their appropriate story categories upon transcription.

The scoring of recall protocols is usually based on an analysis of the meaning and structure of the presented story (Voss et al., 1982). Therefore, the units used in scoring are essentially the same as those used in analyzing the story. In this way, the resulting dependent measure is often simply a tally of the number of units from the presented passage that the recall contains, or a comparison of the presented sequence of units to the recalled order of the units. In the present study, three measures of recall were considered: (a) the number of story category statements accurately recalled, (b) the number of story statement constituents accurately recalled, and (c) the proportion of

moved category statements recalled in the input order position. The first measure was based on a story grammar analysis of the presented stories, in which the basic unit is the story category statement. For the second measure, a more detailed syntactic and semantic analysis of the individual statements was designed. In the third measure, the temporal organization of the recall protocols was analyzed by comparing the input order of the presented stories with the recalled orders. In addition, the temporal ordering strategies that the subjects used in order to maintain local coherence across the moved categories were also investigated.

Although only one individual scored the recall protocols, a second individual scored a randomly-selected subset (10%) of the protocols in order to obtain percentages of interrater reliability on the first two measures on the accuracy of recall. The third measure did not focus on the accuracy of recall, and therefore did not require an assessment of interrater reliability.

3.7.1.1 Accurate Recall of Story Category Statements

In order to determine whether a statement was accurately recalled, the following scoring criteria were adopted. A statement was scored as accurate if the essential meaning of the main clause of the statement had been reproduced. This was determined by the accurate recall of the subject-predicate structure of the main clause, and only modifiers peripheral to the main meaning could be

omitted. Examples of statements that were scored as accurate according to this criterion are the following:

Presented: Jennifer lost her dog in the park.
Recalled : Jennifer lost her dog.

Presented: She searched around the neighbourhood.
Recalled : She looked around for him.

Statements that either distorted the meaning of the presented statement or failed to express the main event or meaning of the presented statement were scored as incorrect. The following are some examples of statements scored as incorrect according to this criterion.

Presented: One day Jennifer and Tom had some bad luck.
Recalled : Jennifer and Tom were in the story.

Presented: One day Susan and Peter were exploring a forest.
Recalled : One day Susan and Peter were walking.

Finally, statements in which the information recalled was either unrelated or incorrect, but still met general structural requirements of the story categories were also scored as incorrect. To illustrate, a subject might have recalled a setting but the information contained therein was not part of the presented story. The following are examples of these types of recalled statements.

Presented: Tom thought he should have stayed in bed.
Recalled : And then he thought he should ride his bike but he didn't.

Presented: She was determined to investigate the noise.
Recalled : She decided to pick the bird up.

When statements did not fit into a story category they were not scored. If a statement was not recalled for a

given category, or if the statement was incomplete it was scored as absent. Other more specific decision rules which were formulated during the actual scoring of the recall protocols are found in Appendix D. After scoring was completed, the total number of accurately recalled statements was counted, and an overall score out of eleven was calculated for each story, for each subject. The interrater reliability on this scoring procedure was 100%.

3.7.1.2 Accurate Recall of Story Statement Constituents

In order to obtain a more precise measure of the information recalled, a measure that scored the recall of information within statements was devised. This analysis was based on the fundamental principle of traditional grammar, and also of modern syntactic theory, that every sentence consists of two obligatory major constituents, a subject and a predicate. In addition, a sentence may also contain one or more adjuncts or modifiers. Moreover, these constituents may be further divided into constituents. To illustrate the manner in which these terms are applied, the sentence *Jennifer lost her dog in the park* will be divided into constituents. The subject of the sentence is *Jennifer*, the predicate is *lost her dog*, and *in the park* is a modifier of place. A further division of these constituents reveals more of the underlying structure of the sentence. The subject is necessarily a noun (or pronoun standing for the noun). The predicate is more complex, and may be one of three types: (a) intransitive verb, (b) transitive verb with

its objects (direct and indirect), or (c) the verb *be* copula with a complement (Lyons, 1968). The complement must be either an adjective or noun. In more complex sentences the object of the transitive verb may be an embedded complement clause. In this case, the embedded clause would also have a subject-predicate structure, and would be divided into constituents. To complete the preceding example, the predicate constituent of the sentence *Jennifer lost her dog in the park*, that is, *lost her dog*, would be divided into the transitive verb *lost* and its object *her dog*. A constituent analysis of the statements in both stories under all three conditions served as the framework for scoring this information in the recall protocols. These analyses and the decision rules that accompany them are found in Appendix D.

After each recall protocol had been divided into constituents corresponding to the framework outlined, each constituent was scored as either correct, incorrect, or absent by comparing the recall protocols to the presented stories. The accuracy of the recalled constituents was determined by the following scoring criteria. Only the verbatim recall of the constituent or the replacement of the presented constituent with a synonymous constituent was scored as accurate. Some examples of constituents that were scored as accurate under this criterion are the following:

Presented	Recalled
discovered	found, noticed, realized

garbage can	garbage bin, trash can, garbage
forest	woods
searched around	looked around
should have stayed	shouldn't have snuck out

In this scoring system, constituents were scored as incorrect if they were less than synonymous, that is, they were semantically more specific or general in nature. Moreover, inferences were scored as incorrect. More specific scoring decision rules with regard to the pronominalization and ellipsis of noun phrases in the recall protocols are noted in Appendix D. The following are examples of constituents that were scored as incorrect according to this criterion.

Presented	Recalled
were exploring	were hiking, were walking
hiking	climbing
under a tree	against a tree
out of the house	out of bed, out of his room
neighbourhood	block, town, place

When each constituent had been scored as either correct or incorrect, the number of correct constituents was tallied for each statement, and a score out of the total number of constituents in that statement was recorded. Then, all the scores for the individual statements were summed for an overall score. These overall scores were then converted into percentages. The interrater reliability on this scoring procedure was 98%.

3.7.1.3 Temporal Organization of Recall

In order to determine whether the subjects preserved the temporal sequence of the presented story input order in

their recall, the recall of the consequence and initiating event category statements, and the number of each of these statements that were recalled in the input order was scored for each subject. Both of these category statements were scored because it is between these statements that local coherence is preserved in the marked movement versions, and absent in the unmarked movement versions. At issue was the question of whether the subjects ordered their recall in terms of input order or whether they "corrected" the marked and unmarked orders that violated the canonical superstructure. Because the focus was on the temporal sequencing of story information, and not strict accuracy of the statements themselves, the scoring criteria used to assess accurate recall of story category statements was broadened to include statements that either distorted the meaning of the presented statements, or failed to express the main event of the statements. These statements would not have been included as accurate in the measure of story category statement recall, but did reveal the maintenance or revision of the story input order. Examples of some statements that were included in this measure are the following:

Presented: Jennifer found her dog digging in a garbage can.
Recalled : And her dog got into the garbage.

Presented: Peter discovered that he was sitting in poison ivy.
Recalled : Peter got poison ivy.

Each subject received a score for both the number of consequence and initiating event category statements recalled (two of each of these category statements per story), as well as a score for the number of each of these category statements recalled in the input order. After the consequence category statements were scored for each of the subjects, the total number of these statements recalled under each of the conditions, for each of the stories was tallied, for a possible total of 24 consequence category statements per story condition (2 consequence category statements per story x 12 subjects per condition x 1 story). Then, the proportion of consequence category statements recalled in the input order position for each story condition was calculated. In turn, the total number of sequences consisting of both the consequence and initiating event category statements recalled was tallied for each story condition, and the proportion of these sequences recalled in the input order was calculated. Moreover, the temporal ordering strategies of subjects recalling the marked and unmarked movement story versions was analyzed in terms of the way in which subjects preserved or added connectives in order to make the moved consequence category statements and the initiating event category statements locally coherent.

3.7.2 Comprehension Question Task

The subjects' responses to the 12 wh-questions were transcribed. Each of the responses was classified into one of three categories: correct, incorrect, and nonresponse. In the correct category, responses were assigned a score of 1 except for question number one (in both stories) which required the names of both of the characters as a response. For this question half marks (.5) were given if the subject provided the name of only one of the protagonists. Children's responses were classified as errors when they clearly contradicted the original story information. In this category, the statements were given a score of 0. Although 12 wh-questions were given, only 11 were scored. The reason for this was that question two proved to be ambiguous in both stories. As a result, it posed some difficulty for the children as well as the scorer, and was omitted from the analyses. An overall score of the number of correct responses to the wh-questions was calculated for each subject.

The statistical analyses of the data, and discussion of the results follows in Chapter Four.

4. RESULTS AND DISCUSSION

4.1 Introduction

Statistical tests were conducted to evaluate the experimental data. In this chapter, the results of the statistical tests are described, and the hypotheses evaluated. First, the two stories (i.e., stories 1 and 2) were statistically compared across three measures described previously: (a) accurate recall of story category statements, (b) accurate recall of story statement constituents, and (c) accurate response to comprehension questions. The two stories were not compared across the measure on temporal organization of recall because there were so few reorderings in each of the stories across all three conditions. In order to develop a clearer picture of the temporal organization of the recall protocols, the results of this measure were pooled across the two stories for each of the story conditions. After the results of the comparisons of stories 1 and 2 are presented, the results of the three recall measures are reported, followed by the results of the comprehension question measure.

4.2 Comparison of Stories 1 and 2

In their research on story comprehension, some investigators have overlooked the fact that differences in the content and structure of stories presented may result in

story effects (Mandler, 1978; Mandler & DeForest, 1979; Stein & Glenn, 1982). These investigators have presented more than one story to subjects, and not reported whether there were any significant differences in how the stories were comprehended, that is, they ignored the number of stories presented as a factor in their design. Although many investigators control their stories in terms of the number and type of story categories, and the number of propositions or statements contained therein, the majority do not control for the length, and the complexity of vocabulary or syntactic structure of the individual statements. Indeed when investigators have considered story effects, significant differences have been reported (Bischofshausen, 1985; Stein & Glenn, 1979; Thorndyke, 1977). In some instances, however, these story differences were noted after the results of the comprehension measures were reported, and as a result, were not always statistically investigated (Mandler & Johnson, 1977; McClure et al., 1979; Weaver & Dickinson, 1982).

The two stories used in this study were controlled in terms of the type and number of story categories, the number of statements in each category, and in the length, and the complexity of the syntactic structure of the statements themselves. Nevertheless, the stories differed in semantic content or theme. In order to determine whether there were significant differences across the two stories, *t*-tests were conducted on each of the three aforementioned measures

(accurate recall of story category statements, accurate recall of story statement constituents, and accurate response to comprehension questions) for each of the story organization conditions (canonical, marked movement, and unmarked movement).

As shown in Tables 3, 4, and 5, *t*-tests revealed that there were no significant differences across the two stories for any of the measures, under any of the story organization conditions. Therefore, because there were no observable differences between stories 1 and 2, the results were pooled in each of the measures. Planned comparisons were conducted on the pooled results of these measures, and these results are presented in the following sections on the recall and comprehension question measures.

4.3 Recall Measures

4.3.1 Accurate Recall of Story Category Statements

The statistics for this measure were calculated on the subjects' raw scores, that is, the number of accurately recalled story category statements out of a total of 11 statements. These raw scores are found in Appendix E.

In order to evaluate the first hypothesis, planned comparisons were conducted across the three story organization conditions. The results of these comparisons are presented in Table 6. For this measure of recall, the prediction that the canonical story versions (M = 8.04)

Table 3

Results of *t*-tests on the Accurate Recall of Story Category Statements

Condition	*N*	Mean	*SD*	*SE*	*t* Val.	*df*	*p* Val.
Canonical							
Story 1	12	8.50	2.02	.58	1.14	22	.27
Story 2	12	7.58	1.93	.56			
Marked Movement							
Story 1	12	7.25	1.77	.51	-.39	22	.70
Story 2	12	7.50	1.38	.40			
Unmarked Movement							
Story 1	12	5.50	2.51	.72	0.00	22	1.00
Story 2	12	5.50	2.24	.65			

Table 4

Results of *t*-tests on the Accurate Recall of Story Statement Constituents

Condition	*N*	Mean	*SD*	*SE*	*t* Val.	*df*	*p* Val.
Canonical							
Story 1	12	78.09	14.33	4.14	1.81	22	.08
Story 2	12	68.33	12.03	3.47			
Marked Movement							
Story 1	12	66.69	13.89	4.01	-.24	16.32*	.81
Story 2	12	67.79	7.05	2.04			
Unmarked Movement							
Story 1	12	53.81	17.69	5.11	-.13	22	.90
Story 2	12	54.76	17.56	5.07			

* Homogeneity of variance rejected - separate variance estimate

Table 5

Results of *t*-tests on the Number of Correct Responses to Comprehension Questions

Condition	*N*	Mean	*SD*	*SE*	*t* Val.	*df*	*p* Val.
Canonical							
Story 1	12	9.46	1.36	.39	-.07	22	.95
Story 2	12	9.50	1.62	.47			
Marked Movement							
Story 1	12	8.04	1.18	.34	-.87	22	.39
Story 2	12	8.46	1.16	.33			
Unmarked Movement							
Story 1	12	6.75	1.52	.44	-.40	22	.70
Story 2	12	7.04	2.05	.59			

Table 6

Planned Comparisons on the Accurate Recall of Story Category Statements

Story Condition	*N*	Mean	*SD*	*SE*
Canonical	24	8.04	1.99	.41
Marked Movement	24	7.38	1.56	.32
Unmarked Movement	24	5.50	2.32	.47

Comparisons	*t* Values
Canonical vs Marked	1.17
Marked vs Unmarked	* 3.28
Canonical vs Unmarked	** 4.45

* $p < .01$
** $p < .001$

would be better recalled than the unmarked movement versions ($M = 5.50$) was supported, $t(69) = 4.45$, $p < .001$. This finding is not surprising in light of previous research showing that the quantity and quality of children's recall of category statements is poorer for noncanonical stories (such as the unmarked movement version) than canonical stories (Mandler, 1978; Mandler & DeForest, 1979; Stein & Glenn, 1978, cited in Stein, 1979). However, as discussed in earlier chapters, both local and global coherence are disrupted when categories are moved to form noncanonical stories. The comparisons between the marked and unmarked movement versions, and the canonical and marked movement versions allow the role of local coherence and global

coherence of story superstructure to be evaluated independently of one another.

The children's recall of the category statements in the marked movement version (M = 7.38) was significantly better than in the unmarked movement version (M = 5.50), $t(69) = 3.28$, $p < .01$, supporting the prediction that the marked and unmarked movement story versions would differ. The only way in which these two story versions differed was in the presence, in the marked movement version, of connectives that preserved local coherence in the story. Thus, this result provides evidence that the presence of local coherence was a significant factor in children's recall of the marked movement story versions. This finding suggests that children's poor recall of noncanonical stories that have traditionally been used in story comprehension studies may have resulted not just from the disruption of story superstructure, but also from the disruption of local coherence and macrostructure. Moreover, speculations that connectives may be important in the processing of noncanonical stories (van Dijk, 1985; Johnson & Mandler, 1980; Mandler & Johnson, 1977) have also been confirmed.

An even more interesting finding, and in fact, an unexpected one, was that the children's recall of category statements in the canonical version (M = 8.04) did not differ significantly from their recall of these statements in the marked movement version (M = 7.38), $t(69) = 1.17$, $p = .248$. This finding has several implications. In

particular, it shows that the disruption of the story superstructure, when marked linguistically as in the marked movement version, did not significantly reduce children's recall of the story category statements. The connectives that marked the correct sequence of events in the story appear to have enabled the listener to create a coherent macrostructure, and may have also cued the listener to the true nature of the story category of the moved statements, possibly by signalling that the moved statement was in fact a consequence category statement. As a result, the connectives that established local coherence in the story may also have served as a link between the construction of a coherent macrostructure and the story superstructure. The absence of these connectives in the unmarked movement version accounts for the significantly poorer recall of the story category statements in this condition.

4.3.2 Accurate Recall of Story Statement Constituents

As noted in the previous chapter, all the scores for this measure were converted to percentages so that the results could be compared across the three story organization conditions. The raw scores for each of the subjects are found in Appendix E.

As in the previous measure of recall, planned comparisons were performed across the three story organization conditions to evaluate the first hypothesis. The results of these comparisons are presented in Table 7.

Table 7

Planned Comparisons on the Accurate Recall of Story Statement Constituents

Story Condition	*N*	Mean	*SD*	*SE*
Canonical	24	73.21	13.87	2.83
Marked Movement	24	67.24	10.79	2.20
Unmarked Movement	24	54.28	17.25	3.52

Comparisons	*t* Values
Canonical vs Marked	1.46
Marked vs Unmarked	* 3.16
Canonical vs Unmarked	** 4.61

* $p < .01$
** $p < .001$

From a statistical perspective, the pattern of results of these pairwise comparisons are similar to those observed in the previous more general measure of recall.

First, the children's recall of the story statement constituents was significantly better under the canonical condition ($M = 73.21$) than under the unmarked movement condition ($M = 54.28$), $t(69) = 4.61$, $p < .001$. This result again supports previous literature that has shown that children's recall of noncanonical stories is poorer in terms of the quantity and quality of recall than their recall of canonical stories (Mandler, 1978; Mandler & DeForest, 1979; Stein & Glenn, 1978, cited in Stein, 1979).

Secondly, the recall of story statement constituents was significantly better under the marked movement condition (M = 67.24) than under the unmarked movement condition (M = 54.28), $t(69) = 3.16$, $p < .01$. This improvement in recall is in the predicted direction: marked movement > unmarked movement. This finding demonstrates that the increased local coherence in the marked movement version significantly improved the sixth graders' ability to accurately recall the story statement constituents. The children were apparently able to recall more of the constituents accurately because of the increase in local coherence, and the corresponding increased coherence of the macrostructure.

There was no significant difference between children's recall of story statement constituents under the canonical condition (M = 73.21) and their recall of the constituents under the marked movement condition (M = 67.24), $t(69) = 1.46$, $p = .150$. The presence of local coherence, and the corresponding increase of coherence in the macrostructure of the marked movement story versions enabled the children to recall its constituents as well as they recalled the constituents of the canonical versions. Thus, the disruption of the story superstructure in the marked movement versions did not have a significant negative effect on children's recall. In light of these results, it would appear that the presence or absence of local coherence was an important factor in children's ability to accurately

recall the story statement constituents of the stories.

Both the more general and traditional recall measure of story category statements, and the more specific recall measure of statement constituents provide evidence that local coherence and the connectives that mark this coherence are important factors in children's recall of noncanonical stories. Most important, however, is the fact that the children were able to recall stories that were locally coherent, and thus globally coherent in terms of macrostructure, as well as stories that were also coherent in terms of story superstructure. This suggests that the canonical story superstructure is not the only significant factor guiding recall. Sixth graders can recall story information accurately even if the superstructure is disrupted, as long as the disruption is marked via linguistic markers such as the connectives. A possible explanation for the positive effect that the connectives had on the children's recall is that children recalling the marked movement story versions were able to devote more of their processing resources to the accurate recall of story information because the connectives provided a coherent story structure, whereas the children recalling the unmarked movement versions were required to devote more of these resources to resolving the incoherence of the story.

4.3.3 Temporal Organization of Recall

In order to determine whether there were significant differences in the way in which subjects ordered their recall protocols across the three story organization conditions, chi-square tests were conducted on (a) the proportion of consequence category statements recalled in the input order position, and (b) the proportion of sequences consisting both of the consequence and initiating event category statements recalled in the input order across the three story conditions. The raw scores that were used to calculate these proportions are found in Appendix E.

The proportion of consequence category statements recalled for each of the story organization conditions was: canonical (.96), marked movement (.92), and unmarked movement (.77). On the basis of this information, the proportions of these category statements that were recalled in the input order position were calculated: canonical (1.00), marked movement(.84), and unmarked movement (.89). In order to evaluate the first hypothesis, a chi-square test was conducted to determine whether there were any significant differences among these proportions across the three story organization conditions (see Table 8 for results). Results revealed that significantly more consequence category statements were recalled in the input order for the canonical version than the marked movement version $x^2(1, N = 90) = 7.78$, $p < .01$, and for the canonical version than for the unmarked movement version

Table 8

Results of Chi-square Tests on the Proportion of Consequence Category Statements Recalled in Input Order Position

Comparisons	*N*	Chi-square Values
Canonical vs Marked	90	** 7.78
Marked vs Unmarked	81	.45
Canonical vs Unmarked	83	* 4.68

* $p < .05$
** $p < .01$

$x^2(1, N = 83) = 4.68$, $p < .05$. However, there was no significant difference in these proportions between the marked and unmarked movement story versions $x^2(1, N = 81) = .45$, $p < .70$.

These findings reveal, not surprisingly, that the children were reordering the position of the consequence categories significantly more often in the marked and unmarked movement versions than in the canonical version. This result confirms the findings in the literature that more reorderings of story information occur in noncanonical stories than canonical stories (Mandler, 1978; Mandler & DeForest, 1979; Stein & Glenn, 1978, cited in Stein, 1979). Nevertheless, it may be surprising that the actual proportion of reordering for any of the story versions was so low: (a) in the canonical version none of the consequence category statements were reordered, (b) in the marked movement version 15.90% were reordered, and (c) in the

unmarked movement version 10.82% were reordered. The overwhelming majority of consequence category statements were recalled in the input order position across all three story conditions despite the fact that the input order violated superstructure in marked and unmarked movement conditions. This finding is in contrast to the results of children's recall of noncanonical stories reported in the literature, where a significant amount of reordering of the input sequence has been observed (Mandler, 1978; Mandler & DeForest, 1979; Stein & Glenn, 1978, cited in Stein, 1979). However, given that only two category statements were moved in the noncanonical versions used in this study, the low proportion of reordering may be a function of the amount of reordering in the presented order. That is to say, the proportion of reordering in recall protocols may increase when more statements are moved in the presented stories. For example, the Mandler (1978) and Mandler and DeForest (1979) studies that used interleaved stories reported a significant amount of reordering in the recall protocols, whereas Bischofshausen (1985), who moved only one statement in the presented stories, reported that the majority of the recalled protocols mirrored the input order.

Although there was no significant difference between the marked and unmarked movement versions, in terms of recalling the consequence category statements in the input order position, it is clear that a much lower number of consequence category statements were accurately recalled in

the unmarked movement story versions. This may indicate that the increased coherence between the consequence and initiating event category statements was an important factor in the accurate recall of the consequence category statements, although not a factor in the temporal organization of those statements recalled.

The temporal ordering strategies of the subjects were investigated by first examining the way in which the subjects either preserved or reordered the input sequence of the moved consequence category statements and the adjacent initiating event category statements. Recall that this sequence of category statements is significant because the local coherence between these two categories is preserved with connectives in the marked movement versions, but not in the unmarked movement versions. The proportion of sequences consisting of both consequence and initiating event category statements was scored across the three story organization conditions: canonical (.92), marked movement (.90), and unmarked (.60). On the basis of these figures, the proportion of sequences that maintained the input order was calculated: canonical (1.00), marked movement (.84), and unmarked movement (.86). A chi-square test (Table 9) revealed that a significantly greater proportion of these sequences were recalled in the input order for the canonical than marked movement version, $x^2(1, N = 87) = 7.71$, $p < .01$, and than the unmarked movement version, $x^2(1, N = 73) = 5.19$ $p < .05$. There was no significant difference between the

Table 9

Results of Chi-square Tests on the Proportion of Consequence and Initiating Event Category Statements Recalled in Input Order

Comparisons	*N*	Chi-square Values
Canonical vs Marked	87	** 7.71
Marked vs Unmarked	72	.08
Canonical vs Unmarked	73	* 5.19

* $p < .05$
** $p < .01$

marked and unmarked movement versions, $x^2(1, N = 72) = .08$, $p < .80$. As such, these results generally reflect the aforementioned findings on the recall of the consequence category statements.

The next step in this analysis involved a closer examination of the way in which subjects: (a) did or did not preserve the local coherence of the two category statements when they were asked to recall the marked movement story versions, and (b) attempted to make the locally incoherent sequence of these two categories coherent when recalling the unmarked movement version. These issues were investigated on the basis of the proportion of sequences consisting of both consequence and intitiating event category statements recalled. A description of the temporal ordering strategies of subjects recalling the marked movement story versions is presented in Table 10, and the strategies of those recalling the unmarked movement story version are presented in Table

11.

In the marked movement version, a very high proportion of the sequences recalled (.92) preserved input order, as well as the connective *before this* in the initiating event category statement. Of the remaining proportion that maintained the input order, there was only one instance in which *before this* was replaced by another connective, and two instances in which no connective was added to connect the initiating event and the consequence category statements. This result stands in contrast to the results of Bischofshausen (1985) who reported that the majority of subjects did not recall the connective *before* in inverted sequences. Of the proportion of sequences in which the input order was not maintained (.16), five sequences (.71) were simply reversed and marked with either an additive or temporal connective (i.e., *and*, *and then*, *and then later*, *then one day*) in the initiating event category statement. There was one sequence in which the consequence statement was moved to its canonical position in the story superstructure (i.e., after the attempt category), and one sequence in which the input order was reversed, and the connective *before this* placed in the consequence category statement.

In the unmarked condition, over half the sequences (.56) that maintained the input order also contained a connective where none had been presented. In an effort to make the sequence coherent, subjects added additive,

Table 10

Temporal Ordering Strategies of Subjects Recalling Marked Movement Story Versions

Local Coherence	Input Order Maintained	Input Order Altered
Retained *before this*	.92	.14
Added Connective	.03	.72
No Connective Added	.05	.14

Table 11

Temporal Ordering Strategies of Subjects Recalling Unmarked Movement Story Versions

Local Coherence	Input Order Maintained	Input Order Altered
Added Connective	.56	.50
No Connective Added	.44	.50

temporal, causal, and adversative connectives. Some examples of these sequences are the following:

1. And Susan found a baby bird.
   And then she heard something in the bushes.
2. And Peter discovered he was sitting in poison ivy.
   So he hiked up a hill.
3. And Tommy he had a bicycle with a flat tire.
   But he was sick.

In addition to adding connectives, subjects also altered the verb tenses of statements in an attempt to make the two statements coherent, as in example 2. The following recalled statements are examples of this strategy.

1. And Peter was sitting in poison ivy.
   And Peter started hiking up the hill.

2. And Peter was sitting in poison ivy.
   And then he went hiking again.

With regard to the connective *meanwhile* which linked the two episodes of the stories, and which was excluded from the unmarked movement condition, the majority (63.15%) of subjects added either an additive connective such as *and* or a temporal connective such as *then* or *and then* to link the episodes.

Of those sequences in which the input order was altered (.13), half contained a connective marking this reversal, and the other half did not. In all cases, the changes in input order were as a result of the reversal of the two statements.

This pattern of temporal ordering suggests that the children were attempting to either maintain or establish local coherence across the two noncanonical story versions. In the unmarked movement version, some of the children tried to create a coherent story in the face of being asked to recall an incoherent story. A considerable number of subjects used connectives or other linguistic devices in order to make the temporal sequence locally coherent. For those subjects who were asked to recall the marked movement story versions, the majority preserved the local coherence of the two category statements by retaining the connective *before this*. When the subjects altered the sequence under the marked movement condition, they primarily reversed the

sequence of the two statements; thus recalling them in the canonical order, (i.e., initiating event before consequence category), but they did not recall the consequence category in the position defined by the story grammar, that is, after the attempt category. The fact that many of the children made the stories coherent even when they were asked to recall the stories verbatim again illustrates the importance of local coherence in children's processing of stories.

4.4 Comprehension Question Measure

4.4.1 Correct Responses to Comprehension Questions

The statistics on this measure were performed on the subjects' raw scores of the number of correct responses out of 11 wh-questions. These raw scores appear in Appendix E.

Planned comparisons were conducted to evaluate the hypothesis that the number of accurate responses to the comprehension questions should not differ among the canonical and marked movement stories but the number of accurate responses for each of these stories should be significantly greater than for the unmarked movement stories. In Table 12 the results of these analyses are are presented.

All three comparisons yielded significant differences. As predicted, the mean for the marked movement version (M = 8.31) was significantly better than the mean for the unmarked movement version (M = 6.90), ($t(69)$ = 3.29,

Table 12

Planned Comparisons on the Number of Correct Responses to Comprehension Questions

Story Condition	*N*	Mean	*SD*	*SE*
Canonical	24	9.48	1.46	.30
Marked Movement	24	8.31	1.19	.24
Unmarked Movement	24	6.90	1.77	.36

Comparisons	*t* Values
Canonical vs Marked	* 2.70
Marked vs Unmarked	* 3.29
Canonical vs Unmarked	** 6.00

* $p < .01$
** $p < .001$

$p < .01$. Again as predicted, the number of correct responses to these questions was significantly better under the canonical than the unmarked movement condition, $t(69) = 6.00$, $p < .001$. However, the number of correct responses to the comprehension questions was significantly better under the canonical condition ($M = 9.48$) than under the marked movement condition ($M = 8.31$), $t(69) = 2.70$, $p < .01$, contrary to the prediction that the marked movement and canonical story versions would not differ on this measure of comprehension.

Before interpreting these results in terms of the role of local and global coherence, a few comments should be made with regard to this task. First, during the actual testing

of the children on this measure, it was noted that the canonical (i.e., chronological) order of presentation of the wh-questions may have increased the difficulty of the task for the children who were asked to recall the marked movement and unmarked movement story versions. The canonical order of question presentation did not follow the input order of the marked and unmarked movement versions, but followed the input order of the canonical versions. Given that the questions were posed after an immediate recall task, it is quite likely that the sequence of story information foremost in the children's memory was the input order of the story. Thus, the canonical sequence of presentation of the wh-questions may have benefited the children listening to the canonical story version more than the children listening to the two noncanonical versions. In hindsight, it may have been more appropriate to organize the wh-questions such that they mirrored the input sequence of each of the stories, and in this way, queried the subjects' knowledge of the sequence of events in terms of how the stories were presented. The way in which the questions in this task should be organized is problematic because it is not clear how the sequence of question presentation will affect the children's performance on the comprehension questions. Without this information, it is difficult to ensure that the demands of the task are equitable across the three groups.

The fact that the children presented with the marked movement story versions did not do as well as those listening to the canonical story versions in responding to the wh-questions would suggest that local coherence did not play the same role in answering comprehension questions as in the recall of the stories. Given that the marked movement versions lacked a canonical story superstructure, it appears that the presence of a canonical superstructure was an important factor in this measure of comprehension. On the other hand, the fact that the children listening to the unmarked movement story versions did not do as well as the children listening to the marked movement story versions suggests that local coherence was also an important factor in children's ability to respond correctly to the questions. The presence of both local coherence and a canonical story superstructure in the stories was essential to the children's successful performance on this task.

A summary of the results of the experiment follows in the Fifth Chapter. Implications for future research are also discussed.

5. CONCLUSIONS

5.1 Summary of the Results of the Experiment

The results of this study support the conclusion that local coherence of story structure is an important factor in children's recall and comprehension of stories. The sixth graders in this study demonstrated an awareness of the function of the connectives, and this knowledge enabled them to recall the marked movement story versions better than the unmarked movement versions and as well as the canonical versions. Local coherence also played an important role in children's ability to answer comprehension questions, illustrated by their significantly better performance in responding to questions on the marked movement than unmarked movement story versions.

Although the presence of a canonical superstructure was not the sole factor affecting the quantity and quality of the sixth graders' recall, it did facilitate their ability to maintain the presented story order in the recall protocols. Moreover, the canonical superstructure was also an important factor in the sixth graders' ability to respond correctly to the comprehension questions: children listening to the canonical stories responded more accurately to the questions than those listening to the marked movement story versions.

These findings emphasize that the processes involved in story comprehension and recall draw on knowledge of both local and global coherence in story structure. Moreover, when the superstructure of a story is disrupted, linguistic devices such as connectives provide the listener with essential information about the global structure of the story. With this information, the listener can create a coherent macrostructure, or global meaning for the story. In this way, the presence of a canonical story superstructure is not the only significant factor enabling story recall or comprehension. Children are able to recall and comprehend story information even when the superstructure is disrupted, so long as the disruption is signalled by linguistic devices such as the connectives. Given these findings, one might argue that the importance of story superstructures in story comprehension has been overstated by those researchers investigating the notions of story grammar and story schema. In actuality, local coherence and a coherent macrostructure are also essential components in story comprehension and recall.

5.2 Implications for future research

The findings of this study have several implications for future research on story comprehension. First, investigators must begin to consider the effect of disrupting story superstructure on the local coherence and cohesion of stories. In order to assess more accurately the

role of story structure knowledge in story comprehension, researchers should focus on adults' and children's comprehension of story versions that are locally coherent and thus coherent in terms of macrostructure, but noncanonical in terms of story superstructure.

Another important factor that should be considered in light of the results of this study is the nature of the task used to assess children's comprehension of stories. This study employed a recall and a comprehension question task, with the former viewed as a measure of recall, and the latter as a more direct measure of comprehension. The patterns of results differed slightly across the two measures, although some potential problems with the latter task were noted that may have contributed to the differences found. Further investigation into the tasks used to assess comprehension of stories, and the way in which tasks may differ in their sensitivity to assessing this comprehension is necessary.

5.3 Conclusion

This study has provided concrete evidence that in story comprehension research to date, the effect of altering the superstructure of the story has been confounded with the disruption of local coherence and a coherent macrostructure. For this reason, special attention should be paid to the role that local coherence, and the connectives that mark this coherence, play in the processing of noncanonical

stories. Lower level components of story structure, particularly in stories that have been disrupted, cannot be ignored. The results of this study emphasize the need for researchers investigating story comprehension to consider the lower level components and processes involved in comprehending and recalling stories.

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APPENDIX A: STORIES

Practice Story

Setting

Once there was a fish named Albert, and he lived in a big icy pond in the forest.

Initiating Event

One day, while Albert was swimming around the pond, he spotted a big juicy worm floating on top of the water.

Internal Response

Albert knew that his friend liked worms, so he decided to catch the worm for his friend.

Attempt

Albert swam around the worm twice. Then he bit into it.

Consequence

Suddenly Albert was caught on a fishing hook.

Reaction

Albert realized that he would never see his friend again so he felt very sad.

Story 1: Canonical

Setting

One day both Jennifer and Tom had some bad luck.

Initiating Event

Jennifer lost her dog in the park.

Internal Response

Jennifer was determined to find her dog.

Attempt

So she searched around the neighbourhood.

Consequence

Then Jennifer saw her dog digging in a garbage can.

Reaction

Jennifer knew that she would have to give her dog a bath.

Initiating Event

Meanwhile Tom was sick in bed.

Internal Response

But Tom wanted to ride his bicycle.

Attempt

So he snuck out of the house.

Consequence

Then Tom discovered that his bicycle had a flat tire.

Reaction

Tom thought that he should have stayed in bed.

Story 1: Marked Movement

Setting

One day both Jennifer and Tom had some bad luck.

Consequence

Jennifer saw her dog digging in a garbage can.

Initiating Event

Before this, Jennifer lost her dog in the park.

Internal Response

Jennifer was determined to find her dog.

Attempt

So she searched around the neighbourhood.

Reaction

Now Jennifer knew that she would have to give her dog a bath.

Consequence

Meanwhile Tom discovered that his bicycle had a flat tire.

Initiating Event

Before this, Tom was sick in bed.

Internal Response

But Tom wanted to ride his bicycle.

Attempt

So he snuck out of the house.

Reaction

Now Tom thought that he should have stayed in bed.

Story 1: Unmarked movement

Setting

One day both Jennifer and Tom had some bad luck.

Consequence

Jennifer saw her dog digging in a garbage can.

Initiating Event

Jennifer lost her dog in the park.

Internal Response

Jennifer was determined to find her dog.

Attempt

So she searched around the neighbourhood.

Reaction

Jennifer knew that she would have to give her dog a bath.

Consequence

Tom discovered that his bicycle had a flat tire.

Initiating Event

Tom was sick in bed.

Internal Response

But Tom wanted to ride his bicycle.

Attempt

So he snuck out of the house.

Reaction

Tom thought that he should have stayed in bed.

Story 2: Canonical

Setting

One day both Susan and Peter were exploring a forest.

Initiating Event

Susan heard a noise in some bushes.

Internal Response

Susan was determined to investigate the noise.

Attempt

So Susan crawled into the bushes.

Consequence

Then Susan found a baby bird chirping on the ground.

Reaction

Susan knew that she would have to take the baby bird home.

Initiating Event

Meanwhile, Peter was hiking up a hill.

Internal Response

But Peter wanted to take a rest.

Attempt

So he sat down under a tree.

Consequence

Then Peter discovered that he was sitting in poison ivy.

Reaction

Peter was worried that he would get very sick.

Story 2: Marked Movement

Setting

One day both Susan and Peter were exploring a forest.

Consequence

Susan found a baby bird chirping on the ground.

Initiating Event

Before this, Susan heard a noise in some bushes.

Internal Response

Susan was determined to investigate the noise.

Attempt

So she crawled into the bushes.

Reaction

Now Susan knew that she would have to take the baby bird home.

Consequence

Meanwhile Peter discovered that he was sitting in poison ivy.

Initiating Event

Before this, Peter was hiking up a hill.

Internal Response

But Peter wanted to take a rest.

Attempt

So he sat down under a tree.

Reaction

Now Peter was worried that he would get very sick.

Story 2: Unmarked Movement

Setting

One day both Susan and Peter were exploring a forest.

Consequence

Susan found a baby bird chirping on the ground.

Initiating Event

Susan heard a noise in the bushes.

Internal Response

Susan was determined to investigate the noise.

Attempt

So she crawled into the bushes.

Reaction

Susan knew that she would have to take the baby bird home.

Consequence

Peter discovered that he was sitting in poison ivy.

Initiating Event

Peter was hiking up a hill.

Internal Response

But Peter wanted to take a rest.

Attempt

So he sat down under a tree.

Reaction

Peter was worried that he would get very sick.

APPENDIX B: COMPREHENSION QUESTIONS

Practice Story

1. Who was in the story?
2. Where did Albert live?
3. What did Albert spot floating on top of the water?
4. Why did Albert decide to catch the worm?
5. How many times did Albert swim around the worm?
6. What did Albert do after he swam around the worm?
7. What happened after Albert bit into the worm?
8. How did Albert feel after he was caught on a fishing hook?

Story 1

1. Who were the characters in the story?
2. What happened to both of them?
3. What did Jennifer lose?
4. What was Jennifer determined to do?
5. Where did Jennifer search for her dog?
6. Where did Jennifer see her dog?
7. What did Jennifer know she would have to do?
8. Where was Tom?
9. What did Tom want to do?
10. How did Tom get to his bicycle?
11. What did Tom discover?
12. How did Tom feel at the end of the story?

Story 2

1. Who were the characters in the story?
2. What were they both doing?
3. What did Susan hear?
4. What was Susan determined to do?
5. Where did Susan crawl?
6. What did Susan find?
7. What did Susan know she would have to do?
8. Where was Peter?
9. What did Peter want to do?
10. Where did Peter take a rest?
11. What did Peter discover?
12. How did Peter feel at the end of the story?

APPENDIX C: VERBATIM INSTRUCTIONS

After a brief conversational period in which the school activities of the day were usually discussed, the experimeter (E) began:

Okay, I want to thank you for helping me with my project.
I'm interested in how people remember stories.
Over the next 10 minutes you'll hear 2 short stories on this taperecorder (E motions to recorder).
After each story, I'll ask you to tell the story back to me, and I'll record you telling the story on this recorder (E motions to other recorder), because otherwise I won't remember what you've said.

Now, I want you to listen to each story very carefully because you'll hear the story only once.
Then after you hear the story, I want you to do something before you tell it back to me, I want you to count backwards from 100 by threes.
You start at 100 and go backward by threes.
Now you won't have to count all the way to zero, I'll tell you to stop counting before that.
After I've asked you to stop counting, then I'd like you to tell me the story <u>exactly</u> as you heard it.
Okay?
I'd like you to tell me the story exactly as you heard it.
Then when you've finished telling me the story, I'll ask you some questions about the story.

Okay, do you have any questions?

(E answers any questions).

Are you ready?
Here's the first story - listen carefully.

(E plays story on recorder. After story finishes, E switches off the recorder).

Okay, now I want you to count backwards <u>by threes</u> starting at 100.

(E times 30 seconds of counting, also keeps counting on track).

Okay good, you can stop there.

(E turns on recorder).

Now I would like you to tell me the story exactly as you heard it.
Whenever you're ready.

(When it appears S is finished) Okay, are you finished?
Great work, now I'll ask you some questions about the story.

(After all the questions are completed).

That was great, now we'll do the second story in exactly the same way.
Ready?

(Same instructions for the second story beginning at the point where E turns on the recorder to play the stories for the subject).

APPENDIX D: SCORING PROCEDURES

Scoring Sheets

CANONICAL VERSION

Story #: Subject #: Age: Sex:

SEQUENCE	SCORES	STATEMENTS RECALLED
Given	Recalled	
SETTING		
INITIATING EVENT		
INTERNAL RESPONSE		
ATTEMPT		
CONSEQUENCE		
REACTION		
INITIATING EVENT		
INTERNAL RESPONSE		
ATTEMPT		
CONSEQUENCE		
REACTION		

MARKED AND UNMARKED MOVEMENT VERSIONS

Story #: Subject #: Age: Sex:

SEQUENCE	SCORES	STATEMENTS RECALLED
Given	Recalled	
SETTING		
CONSEQUENCE		
INITIATING EVENT		
INTERNAL RESPONSE		
ATTEMPT		
REACTION		
CONSEQUENCE		
INITIATING EVENT		
INTERNAL RESPONSE		
ATTEMPT		
REACTION		

Constituent Analysis of the Stories

Decision Rules

In this constituent analysis, the subjects of the category statements were not always scored as separate constituents. The reason for this was that once the protagonists had been introduced in the setting statement and the initial statements of the two episodes in the story, the subjects of the following statements were established or understood. Because the subject constituents in these following statements were in a sense redundant, these constituents were included with their respective predicate constituents. However, the subject constituent was scored separately for those statements in which the subject was first introduced. These statements were the setting and both initiating event category statements in the canonical version, and the setting and both consequence category statements in the marked and unmarked movement versions.

This decision rule also applied to the subjects of the embedded clauses, wherein the subject and predicate of these clauses were scored as one unit if the subject of the embedded clause was the same as the subject of the main clause. If they were not the same, the subject of the embedded clause was scored as a separate unit.

The idiomatic expression *to take a rest* was scored as one unit. This decision was based on the principle that idiomatic expressions should be treated as single lexical units. Although not a idiomatic expression, the sequence of the auxillary verb *have* and its necessary object were also treated as one unit (i.e., *had some bad luck* and *had a flat tire*).

In story 2, the noun phrase *a baby bird* was scored as two constituents (i.e., /a baby/bird/) in the first statement in which it was mentioned and as one unit in the following statements. The reason for this was that once it had been established that the bird was a *baby* bird, the constituent *baby* was redundant and for these reasons was scored only once.

The constituent analyses of the stories are on the following pages. The slash marks (/) indicate the constituent boundaries.

Story 1: Canonical

Setting

/One day both/Jennifer/and Tom/had some bad luck.

Initiating Event

/Jennifer/lost/her dog/in the park.

Internal Response

/Jennifer was determined/to find/her dog.

Attempt

/So she searched/around the neighbourhood.

Consequence

/Then Jennifer saw/her dog/digging/in a garbage can.

Reaction

/Jennifer knew/that she would have to give/her dog/a bath.

Initiating Event

/Meanwhile Tom/was sick/in bed.

Internal Response

/But Tom wanted/to ride/his bicycle.

Attempt

/So he snuck/out of the house.

Consequence

/Then Tom discovered/that his bicycle/had a flat tire.

Reaction

/Tom thought/that he should have stayed/in bed.

Story 1: Marked Movement

Setting

/One day both/Jennifer/and Tom/had some bad luck.

Consequence

/Jennifer/saw/her dog/digging/in a garbage can.

Initiating Event

/Before this,/Jennifer lost/her dog/in the park.

Internal Response

/Jennifer was determined/to find/her dog.

Attempt

/So she searched/around the neighbourhood.

Reaction

/Now Jennifer knew/that she would have to give/her dog/a bath.

Consequence

/Meanwhile Tom/discovered/that his bicycle/had a flat tire.

Initiating Event

/Before this,/Tom was sick/in bed.

Internal Response

/But Tom wanted/to ride/his bicycle.

Attempt

/So he snuck/out of the house.

Reaction

/Now Tom thought/that he should have stayed/in bed.

Story 1: Unmarked movement

Setting

/One day both/Jennifer/and Tom/had some bad luck.

Consequence

/Jennifer/saw/her dog/digging/in a garbage can.

Initiating Event

/Jennifer lost/her dog/in the park.

Internal Response

/Jennifer was determined/to find/her dog.

Attempt

/So she searched/around the neighbourhood.

Reaction

/Jennifer knew/that she would have to give/her dog/a bath.

Consequence

/Tom/discovered/that his bicycle/had a flat tire.

Initiating Event

/Tom was sick/in bed.

Internal Response

/But Tom wanted/to ride/his bicycle.

Attempt

/So he snuck/out of the house.

Reaction

/Tom thought/that he should have stayed/in bed.

Story 2: Canonical

Setting

/One day both/Susan/and Peter/were exploring/a forest.

Initiating Event

/Susan/heard/a noise/in some bushes.

Internal Response

/Susan was determined/to investigate/the noise.

Attempt

/So Susan crawled/into the bushes.

Consequence

/Then Susan found/a baby/bird/chirping/on the ground.

Reaction

/Susan knew/that she would have to take/the baby bird/home.

Initiating Event

/Meanwhile, Peter/was hiking/up a hill.

Internal Response

/But Peter wanted/to take a rest.

Attempt

/So he sat down/under a tree.

Consequence

/Then Peter discovered/that he was sitting/in poison ivy.

Reaction

/Peter was worried/that he would get very sick.

Story 2: Marked Movement

Setting

/One day both/Susan/and Peter/were exploring/a forest.

Consequence

/Susan/found/a baby/bird/chirping/on the ground.

Initiating Event

/Before this,/Susan heard/a noise/in some bushes.

Internal Response

/Susan was determined/to investigate/the noise.

Attempt

/So she crawled/into the bushes.

Reaction

/Now Susan knew/that she would have to take/the baby bird/home.

Consequence

/Meanwhile Peter/discovered/that he was sitting/in poison ivy.

Initiating Event

/Before this,/Peter was hiking/up a hill.

Internal Response

/But Peter wanted/to take a rest.

Attempt

/So he sat down/under a tree.

Reaction

/Now Peter was worried/that he would get very sick.

Story 2: Unmarked Movement

Setting

/One day both/Susan/and Peter/were exploring/a forest.

Consequence

/Susan/found/a baby/bird/chirping/on the ground.

Initiating Event

/Susan heard/a noise/in the bushes.

Internal Response

/Susan was determined/to investigate/the noise.

Attempt

/So she crawled/into the bushes.

Reaction

/Susan knew/that she would have to take/the baby bird/home.

Consequence

/Peter/discovered/that he was sitting/in poison ivy.

Initiating Event

/Peter was hiking/up a hill.

Internal Response

/But Peter wanted/to take a rest.

Attempt

/So he sat down/under a tree.

Reaction

/Peter was worried/that he would get very sick.

Scoring Decision Rules

During the scoring of the recall protocols, several decision rules had to be made with regard to the scoring of the story category statements and the statement constituents. Decision rules on the pronominalization and ellipsis of noun phrases in statement constituents were formulated, as well as rules on the presence or absence of verbs of cognition in the internal response and reaction category statements, and the collapsing of the internal response and attempt category statements.

Scoring of Story Statement Constituents

Pronominalization

The decision rule for pronominalization was designed to take into account that subjects would quite naturally pronominalize proper or common nouns in their recall of the stories, but also to ensure that the decisions made about the accuracy of the recall of the constituents reflected when these proper or common nouns were necessary in the story.

The pronominalization of common nouns was permitted in all instances provided that the referent had been introduced in a preceding utterance. With regard to proper nouns, the names of the protagonists had to be recalled in the setting statement, and in the initial statement of the respective episodes for each story condition, otherwise the subject constituent in these statements was scored as incorrect. The reason for this scoring criterion was that the correct recall of the characters' proper names in these statements was essential to the cohesion and structure of the story. Once the characters were introduced in the setting statements and the initial statements of the episodes, further mention of the character could be made by way of pronouns.

If the names were incorrectly recalled (i.e., Joan instead of Jennifer), the constituent was scored as incorrect in the setting statement, but not thereafter in other statements when the incorrect name was used.

If the subject did not recall a name or names, the constituent was scored as incorrect in the setting statement but not thereafter in the initial statements of the respective episodes.

Ellipsis

In scoring the recall protocols, it was observed that some subjects ellipsed story information in their recall of

constituents when this information had been recalled in the preceding statement. Therefore, the following decision rule was adopted.

If the subject or object of a constituent is ellipsed, the subject will receive a correct score for the constituent provided that the correct noun phrase appears in the statement immediately preceding that utterance, and provided that the remainder of the constituent is correctly recalled. The actual number of constituents in which information was ellipsed was extremely low.

Scoring of Story Category Statements

Verbs of Cognition

In the recall of the internal response and reaction category statements of both stories, the presence of a verb of cognition or a mental verb is essential to the meaning of these story category statements. These verbs (i.e., thought, was worried, knew, was determined, wanted) or similar mental verbs had to be recalled in order for the statements to be scored as correct.

In the consequence category statements that contained the mental verb *discover*, the statement was scored as correct even when the mental verb was not recalled because the primary piece of story information in this category statement is what was discovered and not the fact that the subject became aware of the consequence.

Internal Response and Attempt Category Statements

Several subjects combined the internal and attempt category statements. Not many of these statements were recalled in this manner, and this pattern of recall was observed only in the second episode internal response and attempt category statements. For both stories, *wanted* was the mental verb in the internal response category statement.

Presented: He wanted to ride his bicycle.
So he snuck out of the house.

Recalled : And he snuck out of the house
and went to ride his bicycle.

Presented: He wanted to take a rest.
So he sat down under a tree.

Recalled : Because he wanted to sit down for a rest.

In order for the attempt category to be scored as correct, some form of concrete action that was motivated by the character's internal response had to be expressed. In this way, the first example would have been credited with a correct score for the attempt statement, whereas the second example would not have received a correct score for this category statement.

With regard to the internal response category, the rule that some form of mental verb had to be recalled when one was given applied here. Therefore, the first example would not have received a correct score for the internal response category statement whereas the second example would have.

APPENDIX E: RAW DATA

In the following presentation of the raw data, the measures used to assess the recall and comprehension of the stories are referred to as measures 1, 2, 3, and 4 as follows.

Measure 1: Accurate Recall of Story Category Statements (total: 11).

Measure 2: Accurate Recall of Story Statement Constituents (totals: canonical and unmarked movement: 35, marked movement: 37).

Measure 3: Number of Consequence and Initiating Event Category Statements Recalled ((#) total: 2 for each), and the number of these statements recalled in the input order (IO).

Measure 4: Number of Correct Responses to Comprehension Questions (total: 11).

Stories 1 and 2: Canonical Version

Subjects	Measure 1	Measure 2	Measure 3				Measure 4
			Init. Event		Consq.		
			#	IO	#	IO	
(#)	(11)	(35)	(2)		(2)		(11)
Story #1							
15	10	31	2	2	2	2	11.0
21	8	26	2	2	2	2	10.0
34	4	18	2	2	2	2	7.0
36	10	30	2	2	1	1	11.0
41	8	26	2	2	2	2	9.0
43	7	23	2	2	2	2	8.5
44	11	35	2	2	2	2	10.0
47	10	29	2	2	2	2	9.5
48	7	24	2	2	1	1	8.0
49	7	22	2	2	2	2	8.0
52	10	33	2	2	2	2	10.5
57	10	31	2	2	2	2	11.0
Story #2							
11	8	24	2	2	2	2	11.0
14	9	27	2	2	2	2	10.0
25	5	17	0	0	2	2	9.0
45	10	27	2	2	2	2	11.0
59	9	26	2	2	2	2	10.0
60	5	16	2	2	2	2	7.0
61	6	26	2	2	2	2	7.0
63	5	22	2	2	2	2	7.0
65	7	20	2	2	2	2	10.0
66	8	28	2	2	2	2	11.0
71	10	28	2	2	2	2	11.0
72	9	26	2	2	2	2	10.0

Stories 1 and 2: Marked Movement Version

Subjects	Measure 1	Measure 2	Measure 3				Measure 4
			Init. Event		Consq.		
			#	IO	#	IO	
(#)	(11)	(37)	(2)		(2)		(11)
Story #1							
4	6	20	2	1	2	1	8.0
9	10	31	2	2	2	2	10.0
13	5	18	2	1	1	0	7.0
16	9	27	2	1	2	1	9.5
17	7	25	2	2	2	2	7.0
18	5	16	2	2	1	1	6.0
26	7	26	2	2	2	2	8.0
29	8	30	2	2	2	2	9.0
37	9	30	2	2	1	1	8.0
40	7	23	2	1	2	1	9.5
42	5	19	2	1	1	0	7.0
46	9	28	2	1	2	1	9.0
Story #2							
2	7	20	1	1	2	2	7.0
3	9	26	2	2	2	2	8.0
7	9	29	2	2	2	2	11.0
8	7	27	2	2	2	2	9.0
19	9	25	2	2	2	2	8.0
27	8	24	2	2	2	2	9.0
55	6	24	2	2	2	2	8.0
58	7	25	2	2	2	2	8.5
62	8	29	2	2	2	2	8.0
64	9	24	2	2	2	2	10.0
67	6	26	2	1	2	2	8.0
70	5	22	2	2	2	2	7.0

Stories 1 and 2: Unmarked Movement Version

Subjects	Measure 1	Measure 2	Measure 3				Measure 4
			Init. Event		Consq.		
			#	IO	#	IO	
(#)	(11)	(35)	(2)		(2)		(11)
Story #1							
6	1	5	0	0	0	0	3.0
22	6	23	1	1	2	2	6.0
28	7	20	2	2	2	2	7.5
30	8	25	2	2	2	2	7.0
31	7	23	2	1	2	1	9.0
33	5	20	2	2	2	2	7.5
35	7	22	2	2	1	1	8.0
39	7	21	2	2	0	0	7.0
51	2	12	1	1	1	1	6.0
53	3	16	1	1	2	2	5.5
54	4	13	2	2	0	0	7.5
56	9	26	2	2	1	1	7.0
Story #2							
1	6	22	2	2	2	2	7.0
5	9	31	2	2	2	2	10.0
10	6	20	1	1	2	2	6.0
12	3	13	0	0	1	1	4.0
20	6	17	2	2	2	2	7.0
23	5	17	1	0	2	1	6.0
24	2	9	1	0	2	1	7.5
32	6	24	2	2	2	2	7.0
38	9	26	2	2	2	2	11.0
50	4	17	1	1	2	2	7.0
68	7	21	1	1	2	2	8.0
69	3	13	2	0	1	0	4.0